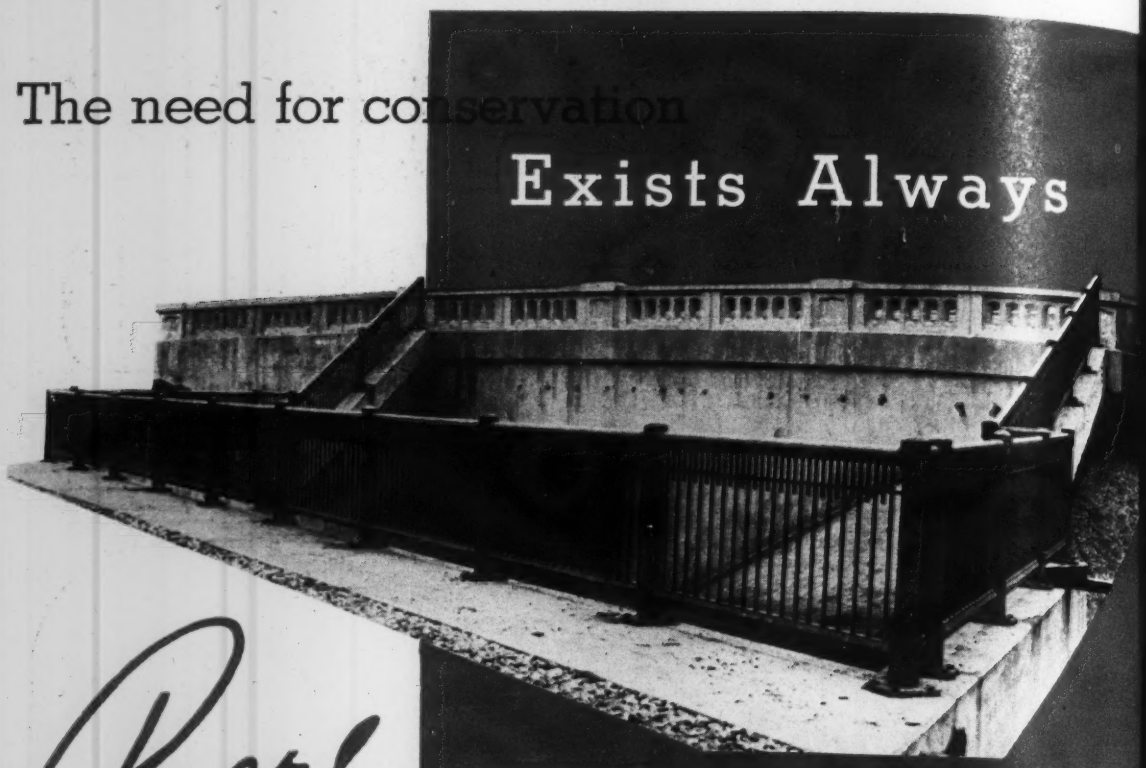
ENGINEERING NEWS-RECORD

NOVEMBER 4, 1943

The need for conservation Exists Always



Byers WROUGHT IRON

The war has necessitated the use of substitute materials for some applications. The thoughtful engineer will recognize that this is not a new engineering principle, but an admitted expedient. When you look at a fine wrought iron bridge railing like this, on an underpass built by the Missouri State Highway Department for the Missouri Pacific Railroad, it is almost possible to *see* the permanence that is associated with a job done right. The over-all economy and *true* conservation are obvious.

Durability is perhaps the most important factor in bridge railing design, not only from the standpoint of economy in time, money and materials, but from the safety angle. But *appearance* has been receiving increasing attention from designers for several years . . . with special reference to reducing view obstruction. Both needs have been and can be completely met with Byers Wrought Iron.

Byers Wrought Iron has been used for railings and other bridge applications for many years. Its ability to resist corrosive attack from moisture, atmosphere, locomotive gases and similar destructive agents, are matters of personal knowledge to almost every bridge man. These service qualities are the result of wrought iron's unique structure.

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By combining pipe, bars and angles—all available in Byers Wrought Iron—extremely attractive effects can be worked out. A number of unusual treatments are illustrated in our technical bulleti "Wrought Iron in Bridge Co struction." If you are thinking terms of a bridge for today a cannot build the railings just you might wish, perhaps you c best serve the conservation pr gram by using out-and-out te porary materials, and employing design that will permit later placement with wrought iron. you are planning a bridge for t morrow, you will find the sugge tions in the bulletin of immedia help and interest. May we se you a copy?

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Vol. 131 NOVEMBER 4, 1943 No. 19

COMING NEXT

• A most difficult and complex problem of lining restoration was recently presented when erosion caused a large invert break in the spillway tunnel at Boulder Dam. Repair was made by bulkheading off the backflow of the river at the tunnel outlet, unwatering, trimming and cleaning the scoured area, backfilling with concrete, and finishing the surfaces. The cause of the break and how the problem was solved will be of special interest to hydraulic engineers — See *ENR*'s Nov. 18 issue.

• An unusual scissors-leg support and carriage for moving and placing 98-ft. long, 100-ton sections of rotary kilns was recently developed by Aluminum Co. of America engineers. The usual stacks of cribbing and complicated rigging used in the old method of rolling kilns into position were eliminated, likewise the use of heavy cranes requiring special tracks. The equipment and method employed will be described in the Nov. 18 issue.

• A new, accurate and inexpensive gaging station for small streams has been developed. The design is based on extensive model studies and an experimental installation which measures the runoff from a 3.85-sq.mi. drainage area. Discharge characteristics of the models and the field installations would indicate that the station is accurate for a wide range of flows. Details of this development will be published in *ENR* for Nov. 18.

LOOKING AHEAD

• Foundations for a blast furnace rising 200 ft. above ground level required unusual support. To solve the problem it was necessary to drive 25 open-pipe caissons through 130 ft. of plastic clay to rock for the main structure. Lighter loads were carried on 5,000 pipe-piles driven generally closed-end, to rock. Difficulties experienced and procedure employed will be described in *ENR* for Dec. 2.

• A simple and accurate means of calculating the maximum direct compression load that can be put on eccentrically loaded wood columns or columns with a side load will be presented in the December 2, issue.

	PAGE
The Week's Events	73
Reader Comment	80
Editorials	82
Mud, Straw, Bally Poles and Brick WALDO G. BOWMAN	84
Permeable Dikes Built of Wire Fencing	90
War Sanitation Problems in Massachusetts	91
Simplified Design for Munitions Igloos	92
How Zinc Saves Steel from Rusting F. C. SCHMUTZ and G. W. ASHMAN	98
Bridge Bearings Replaced Under Traffic	103
Pipe for Delivering Concrete Has Renewable Bend Feature	105
Plywood Plate Girders for Buildings	106
Hospital Construction in Winter Weather	109
Manual Welding Technique for Thick Steel Plates	112
From Field and Office	114
Book Notes and Reviews	116
Unit Prices	118
News of the Week	125
New Aids to the Constructor	134
Manufacturers' Activities	143
New Trade Publications	152
Men and Jobs	157
Meetings	159
Elections and Activities	159
Construction Reports	167

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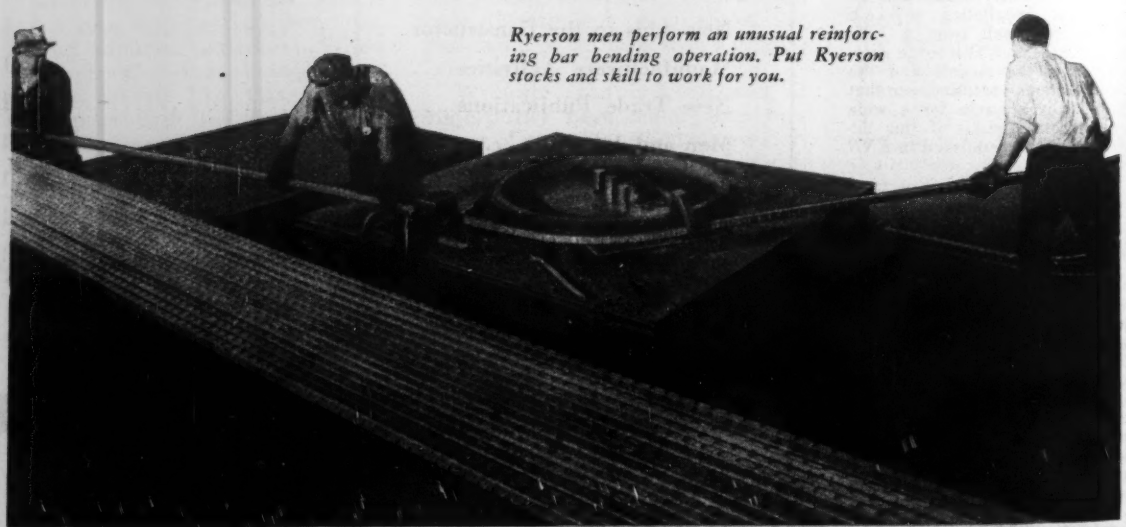


Ryerson men perform an unusual reinforcing bar bending operation. Put Ryerson stocks and skill to work for you.

RYERSON REINFORCING STEEL-SERVICE

The Week In Engineering and Construction

GINEERING NEWS-RECORD • NOVEMBER 4, 1943 • VOLUME 131 • NUMBER 19

Need excavating equipment for strip mining in England

War Production Board seeks to obtain needed equipment from contractors' reserves, also from any idle equipment supplies in hands of the Army.

Over three hundred pieces of used struction equipment are wanted by War Production Board for ship- t to England to speed up that coun- strip mining of coal. The quota e shipped has been set at 150 shovels 100 draglines of two cubic yard ca- ity or larger and 100 large size trac- with bulldozers and scrapers.

The Army now has some surplus that be used for this purpose, but most its idle equipment is being rebuilt the use of construction battalions. ctically 90 percent of the new equip- nt also is being shipped overseas for itary use.

Types of equipment

Equipment offered to meet this new tish requirement will be accepted er "as is", repaired or rebuilt. In the e of shovels and draglines, either el, gasoline or steam engines will be eptable. The following makes and dels are sought:

ucyrus-Erie, 37B, 43B, 44B, 48B, 54B, , 52B
ucyrus Monighan, 3W, 9W
Koehring, 601, 603, 701, 702, 801, 802, 803
Lima, 602, 750, 802, 901, 1001, 1201
Marion, 362, 371, 372, 382, 392
Thew-Lorain, 77, 78, 79, 80, 82, 87, 95
Harnischfeger, 655, 705, 755, 800, 855, 900, 55
Northwest, 6, 7, 8, 70, 78, 80, 8, 95

Of the 100 used tractors asked for, h must be equipped with bulldozer or ledozer; 60 of them should be ipped with 12-18 cu.yd. hauler-scrap- . Equipment wanted, in the large sizes, ludes caterpillar D8 and RD8; Allis almers HD14; Cletrac SD.

A small number of smaller tractors l be accepted, including Caterpillar , RD7; International Harvester TD ; Allis-Chalmers UD10. Any suitable aper equipment for operation of any en tractor will be satisfactory.

Contractors having any of the named equipment which they are willing to sell are asked to contact the construction machinery specialist at the nearest WPB regional office.

Selling arrangements

One of the main deterrents to contractors' selling their surplus construction equipment in the past has been the price ceilings set by the Office of Price Administration. Price setting has long been a matter of controversy between OPA and the Used Equipment Section of WPB's Construction Machinery Division. It is understood, however, that OPA has now made certain concessions in pricing, to be announced soon, which will afford contractors more incentive to sell.

In the past, an owner could get no more than 85 percent of new cost for his equipment, no matter how little it had been used. This was also the price for any rebuilt equipment which carried a guarantee. Without a guarantee, the price set was 55 percent. It is understood that OPA's revised regulation will include provision for a graduated scale of prices, according to model, as has long been the custom in the used automobile trade, and that the revised prices will be in effect for all types of used construction equipment.

. . .

Limit on construction modified by the WPB

Modifications of Order L-41, limiting the amount of constructions without authorization from the War Production Board, have been made. A major change makes it applicable to a calendar year instead of any 12-month period. The value of used materials no longer need be included in the $200 limit on all but farm construction, nor need free labor be included. Insulation to conserve fuel is exempt from the orders.

Press Assn.

American bulldozers break way to Lae

Allied soldiers man American bulldozers which break the way for an assault on Lae, New Guinea, against the Japanese. Artillery followed the bulldozers, and Americans and Australians captured Lae on Sept. 18 over strong opposition.

Letter from LATIN AMERICA

By Edward J. Cleary
Managing Editor, Engineering News-Record

This is one of the earlier dispatches from Mr. Cleary, which was delayed in transit because of military censorship. Other reports appeared in the issues of Sept. 30, Oct. 7, 14, and 21.—The Editors.

A U. S. Army Airbase, somewhere on the west coast of South America—A long and tiresome journey overland, partly through the jungle, brought me to this spot along the Pacific coast where the Stars and Stripes are flying. And tonight, at a picnic in the Officers' Club, I had some "hot dogs" and beer that had been flown in from the States a few hours before.

Boy, that grub hit the spot! But don't get me wrong. South American food has been tops in both quality and quantity. It was the change to something familiar that I welcomed.

Construction operations here were completed some time ago by the Tucker McClure Company of Los Angeles, and because of military restrictions, there are limitations to what I can describe. However, I did have an opportunity to see how a Post Engineer—who is a long way from home-base—operates on his own with considerable ingenuity.

The engineer is Capt. S. Lickton, formerly employed in the construction division of the Chicago Department of Public Works. When something goes wrong at this place he cannot pick up the phone for information, and furthermore, the answers to his problems are probably not to be found in any engineering texts.

Sewage disposal problem

For example, here is his problem in sewage disposal. The ground at this site is a finely divided clay-sand material that simply will not absorb water. As soon as it gets wet it seems to swell and defies further penetration of moisture. As a result, the drainage laterals from the septic tanks soon proved useless.

To provide some means for taking care of tank overflow he is experimenting with the use of big pits, filled with cracked stone. Although the pits eventually fill up with liquid effluent, a certain amount of purification takes place when the liquid first trickles down through the stone, and this reduces the odor nuisance. By alternating with another pit, he hopes to have a sufficient "resting" period during which the liquid either will evaporate or slowly work out in the surrounding ground.

Then there is the matter of water supply. There are no streams in the area, and the groundwater is negligible; potable water is obtained from sea water evaporators. For flushing latrines, Captain Lickton has made some dosing siphons, using for this purpose oil drums and pipe fittings; these siphons are connected with the sea water fire fighting system and adjusted with a valve connection so that they discharge once every two hours. This has helped tremendously in the conservation of water.

When it comes to mixing concrete, Captain Lickton admits to the violation of orthodox principles in using sea water and ocean sand, but he does get a hard and durable material that looks and acts like the best concrete. The mix is 1:3:6, to which 5½ gallons of water are added; the concrete takes its initial set in one hour, but after seven days it is still soft and can be easily scratched with your fingernail. In 15 days, however, the pour gets hard, and so far as durability is concerned, the captain points to some mighty fine looking concrete put in by the contractor, from whom he learned what to do.

Roadbuilding challenge

Roadbuilding with local materials offers another challenge. Near the airbase there is a huge area of tar-saturated sand known as *brea*; this is a natural formation dating to pre-historic times, evidenced by the fact that the *brea* contained mastodon bones. The tar sand is exposed by stripping off about two feet of overburden, beneath which there is found a ten to twelve foot layer of *brea* underlain by a level clay floor. (See picture.)

Brea is a wonderful material for road surfacing except that it is too rich in tar and oil. This was recognized when the roads were laid, at which time shell was added to make the mix leaner. Without any previous experience, however, so far as action of heavy vehicles and equipment was concerned, the amount of shell originally added was inadequate. Captain Lickton is now blading up sections of road and is experimenting with the addition of various amounts of shell to determine what quantity should be added for a firm and suitable mix.

His "laboratory" is the road itself and his testing "equipment" is a steady stream of husky army trucks that roll around the base. With such a setup the captain does not expect to get any analytical results that will later serve as a basis for a profound exposition, but he will soon know what mix will stand up best under heavy traffic. At this outpost the only thing that counts is the final results—and no academic questions are raised as to how they were achieved.

Commanding officer at the base is Colonel ———, who for more than two decades has been actively engaged in army flying. His interests go far beyond things aerial, however. That night as we sat in his headquarters chatting about new engineering developments he turned the discussion to sewage treatment methods, and then detailed some experience

Tar-saturated sand, known as brea, was found in abundant quantity near one of our airbases in South America where it was used for road surfacing. Captain Lickton, post engineer, is from Chicago.

...ngle travel in style—but after five hours of bumping around sharp curves in this ...nveyance it wasn't as comfortable as it looks.

...ith the contact aeration process. After ...had gotten over my surprise that here ...as a busy Air Force officer thousands ...f miles from the States talking about ...omething of which relatively few sani...ry engineers were acquainted. I learned that the colonel had formerly commanded a camp in Texas where the Hays contact aeration process was installed.

I must confess that I never expected to be talking about contact aeration while sitting beneath the Southern Cross.

Reinforcing steel for essential work

A large amount of reinforcing steel, ...wer and above the usual quarterly allot...ents, is now available to "claimant ...gencies" under War Production Board ...egulations. It will be allotted for essen...ial construction work on the same basis ...f need that governs quarterly allot...ents, except that distribution will not ...e restricted to any particular amount ...r any given quarter, but will continue ...o be made available as needed, as long ...s the available steel supply lasts.

Steel available for this purpose is re...olled rail steel and off-heat reject bil...ets which have gone through the mill ...ut can't be released for structural uses ...ecause the steel doesn't quite meet ...pecifications. According to the Steel ...ivision of the WPB, the mills could not ...ake bars fast enough a year ago to meet ...e demand, but the present demand is ...nly about one-fourth of what it was this ...me last year.

The present abundance of supply over ...emand is said by the division to be due ...o the fact that the war-construction ...rogram is fast nearing completion; and ...ecause the claimant agencies have not ...ken all they could, but have used sub...itutes for reinforcing steel wherever ...ossible, in order to save their quarterly ...llotments for other more essential types ...f steel.

It is not anticipated that the added ...upply of reinforcing steel will increase ...he amount of construction work, since ...ther materials continue on the con...rolled and critical lists. But WPB expects that reinforced concrete will now be used to a considerable extent instead of lumber, now scarce than steel.

The Materials Control Branch of WPB states that there is available for rental purposes, in principal cities throughout the country, 9,506,700 sq. ft. of removable steel forms for concrete joist construction, 1,203,000 sq. ft. of removable steel forms for flat slabs, 727,500 lineal feet of steel-column forms of varying diameters, 1,422,000 sq.ft. of used wood panel forms and 721,500 lineal feet of fixed and adjustable shoring.

"In all cases our recommendation is that the design be made based on the availability of metal forms using flat-slab construction for heavy floor loads rather than beam and girder type, and metal pan construction for light floor loads." Trouble could be avoided, the statement adds, "if the designer would first acquaint himself with the type of construction best suited to his needs according to present availability of materials." Further information is available from the Materials Control Branch.

• • •

President Atwell resigns from Thompson-Starrett

George J. Atwell has resigned as president and director of the Thompson-Starrett Company, well-known New York builders, to devote his full time to the George J. Atwell Foundation Corporation. Succeeding him as president of the Thompson-Starrett Company is Peter W. Eller, who has been vice president and a director of the firm.

Engineering Examiners to expand activities

Expansion of the activities of the National Council of State Boards of Engineering Examiners as soon after the war as conditions permit was authorized at the annual meeting of the council held in Indianapolis, Oct. 25-26. The board of directors was authorized to secure subscribing members in order to finance this expansion. At present the council's activities are supported by graduated assessments on the 47 state boards of engineering examiners that are members of the council. The board is to be assisted in its study of appropriate postwar activities by a committee made up of seven past presidents.

T. Keith Legaré, executive secretary of the council, reported that records of the member boards show a total of 72,000 registered engineers in good standing in this country as of June 30. New members added to the council this year are Missouri, Massachusetts and North Dakota. The only states not now having laws governing the practice of professional engineering are Montana and New Hampshire. Thirty-three states were represented at the meeting.

Model law approved

Recent changes made in the model law for registration of professional engineers by the joint committee representing the several engineering societies were approved by the council except for some minor details of wording. The principal changes are designed to give legal standing to "engineers-in-training."

New officers elected at the meeting are as follows: President, Carl L. Svensen, Austin, Texas; vice president, H. T. Person, Laramie, Wyo.; directors, H. T. Plumb, Salt Lake City, Utah, and L. L. Patterson, State College, Miss.

The next annual meeting of the council will be held at Lexington, Ky., Oct. 30-31, 1944.

• • •

New England flood dam put into service

The completed Franklin Falls Dam on the Pemigewasset River at Franklin, N. H., was dedicated Oct. 22. It is a major link in a chain of flood control reservoirs projected for the Merrimac River basin. Work on the dam was begun Nov. 14, 1939, by the Coleman Brothers Corp., of Boston, Mass. Final completion was delayed by war conditions. The project cost $7,783,000. Col. George W. Gillette, New England Division Engineer, U. S. Engineer Department, opened the eight gates that permitted the water to flow through the reservoir outlets.

The dam is a rolled-earth fill 130-ft. high and 1,700 ft. long.

American Public Works Association lays groundwork for postwar planning

Federal, state and city administrators seek to integrate aims for big construction program in field of public service. Storrer elected president of the association.

Urging that detailed plans for postwar construction projects should be completed as quickly as possible, Maj. Gen. Philip B. Fleming, administrator, Federal Works Agency, told delegates to the 49th annual conference of the American Public Works Association at Chicago last week, that the only safe course for public-works engineers and officials is to plan for a considerable amount of public construction.

General Fleming advanced the belief that a billion dollars worth of construction planned so that it can be started immediately after the war will be of more value to our postwar employment problem than forty billion dollars worth that might be gotten underway five years from now. In an effort to dispel any notions that postwar plans involve work relief or the return of WPA, he vigorously asserted that no responsible public official is thinking along such lines.

Despite the inconveniences of wartime travel some 345 members of the association attended the four-day conference. This was an increase of nearly 50 percent over last year's attendance. Spotlighted on the program were discussions on vital wartime problems including street and highway maintenance, collection, disposal and salvage of refuse, and service problems in congested industrial areas.

Abstracts from the papers presented at the technical sessions will be published in a forthcoming issue.

Manpower problems

Of special interest was a report on the present manpower problems by Dan A. Revzan, acting division chief, bureau of program requirements, the War Manpower Commission. Said Mr. Revzan:

"Although the size of the Army was increased by 7,300,000 and our overall civilian labor force by 10 million between October, 1941 and July, 1943, we still must place an additional 4,600,000 persons in more essential categories by the end of next June." Of this number, 200,000 will be needed to produce food, two million for production of munitions and an equal number for the armed forces. Federal war agencies will require 300,000 more workers and 100,000 must be added to the transportation services.

The WMC expects to get these workers, said Mr. Revzan, by decreasing the number of unemployed by 200,000, by shrinking the number of agricultural workers by 100,000 and non-agricultural workers by 1,700,000. The trades and service groups are expected to furnish 700,000 workmen, while 800,000 will come from the construction industry. One-half of the remaining one million workers required by the WMC will be women entering war work while the other half will be secured through the normal increase in new workers entering the field.

Army waste disposal

In reporting on the success of the sanitary fill method of waste disposal at army posts, Jean L. Vincenz, office of the Chief of Engineers, War Department, stated that 111 Army posts within the United States are now disposing of their refuse by this method. (*ENR* Dec. 17, 1942, p.851). Operating experiences cited by Mr. Vincenz, will be reported in a forthcoming issue.

That the repairs and utilities branch of the office of Chief of Engineers is engaged in one of the largest jobs of city management, was borne out by statistics on its present operations cited by Mr. Vincenz.

In taking care of real property and the operation of utilities at every army establishment in this country, including leased hotels and other buildings, the Army maintains and repairs a road mileage equivalent to 13 times across the United States from east to west; 3,300 miles of railroad; more than 1,000 water systems and sewage disposal plants and 17,000 miles of electrical lines. There are 1,000,000 acres of airfields and parade grounds to be cared for as well as the overall care of grounds within Army reservations equivalent to the combined areas of Connecticut, Massachusetts and Rhode Island.

Master plan for cities

Better living and working conditions within our cities will be established best through a "master plan" of construction. This was the consensus of the association. Such a plan, if composed of an integrated group of definite projects, not only would create a workable long-term construction program of civic improvement, but would serve as an emergency employment medium should the necessity arise.

In commenting on Chicago's plans for the future, H. E. Kincaid, executive director, Chicago Plan Commission, asserted that any master plan for civic improvement should include a correlated series of studies on the many phases of community activity. Such activities might well include housing, health and sanitation, railroads and local transit, airports and highways, parking terminals, police and fire protection, traffic control, schools and playgrounds, industry, commerce and other major aspects of the urban structure affecting public welfare and private interests.

"Do you public works engineers and officials want the continuance or discontinuance of a governmental department of public works? Or should the responsibility for postwar public works construction be divided between other governmental departments?"

These were some of the questions asked by Dr. Charles E. Merriam, professor emeritus of political science, University of Chicago, who was the speaker at the association's annual banquet.

Dr. Merriam pointed out that with bills now pending in Congress relating to grants-in-aid for construction programs, it is time to give serious thought to the proper relations between federal and state public works as well as city or rural works programs. Just how it is planned to distribute any federal funds between these various agencies is of primary importance now as it will have considerable bearing on postwar planning.

Awards and officers

The Veteran's Award of the association, given annually to members who have been in the employ of any one city for 30 years, was presented to five municipal engineers. These were: Loran D. Gayton, assistant city engineer, Chicago; Robert M. Smith, director of public works and city engineer of Kenosha, Wis.; Walter A. Heimbuecher, city engineer of University City, Mo.; Thomas E. Collins, city engineer of Elizabeth, N. J.; and Leon Peck, superintendent of streets, Hartford, Conn.

Edward S. Rankin, engineer of the division of sewers, Newark, N. J. received a special silver medallion award in recognition of his record of attendance at the association's annual meetings. This meeting was the 40th consecutive one that Mr. Rankin has attended.

Frederick R. Storrer is the newly elected president, succeeding Henry L. Howe, city engineer, Rochester, N. Y. Other elected officers include: first vice president, Lt. Col. Stuart M. Weaver, U. S. Corps of Engineers, Washington, D. C.; second vice president, Capt. Samuel S. Baxter, U. S. Corps of Engineers, New York City; and treasurer, Albert P. Learned, consulting engineer, Kansas City, Mo.

Newly elected directors of the association include William Sydow, director of public works, Miami, Fla., and C. L. Wartelle, city engineer, Seattle, Wash. Wm. J. Galligan, division superintendent, bureau of streets, Chicago, was reelected to the board.

New power station for Niagara district

The new De Cew Falls power station of Hydro Electric Power Commission of tario was put into service officially on 14. It is located at the foot of the agara escarpment near St. Catherine, t., near the old De Cew Falls plant lt many years ago by the Dominion wer and Transmission Co. to supply wer to the city of Hamilton. The latter nt now belongs to the Ontario Hydro mmission. It was one of the first rela- ely high head plants to be built in the st and is unique in that its water tur- es come from three different European kers. The old plant is being kept in rvice but ultimately will be replaced an expansion of the new plant.

The new plant, operating under a head 265 ft., takes its water from Lake Erie rough the Welland River and the Wel- d Canal. Its tailrace discharges to ke Ontario through the channel below locks that carry the canal down the carpment. Water being used is part of flow diverted into Lake Superior by commission from Arctic waters to crease the flow available for power in Niagara district. (*ENR* April 24. 41, p. 599).

Due to the shortage of materials with ich to build turbines, one generating it of 65,000-hp. capacity was brought m the Abitibi Canyon plant in North- Ontario for installation in the new tion.

The new power station was built by construction division of the Ontario dro Commission, D. Forgan being nstruction engineer. Otto Holden is ief hydraulic engineer and T. H. Hogg chief engineer and chairman of the mmission.

Labor Board ends strike on Texas steel plant

A strike of 1,400 A. F. of L. craftsmen on the $20,000,000 new steel plant for the Sheffield Steel Corp. at Houston, Tex., that began on Oct. 11, ended on Oct. 26, when the workers returned to their jobs on orders from the War Labor Board. The board set up a tripartite panel to hold public hearing and make findings.

The strike is believed to have been inaugurated by the Houston Building Trades Council of the A. F. of L. to force the construction industry in Houston to employ only members of the Common Laborers Union instead of the nonunion common laborers and truck drivers that the contractors now employ in accordance with a contract made with the Building Trades Council in 1938.

On October 8, at a meeting of the Houston Associated General Contractors labor committee and the union officials of 10 building trades of the Houston A. F. of L. Building Trades Council, the unions demanded that the contractors sign a contract with the building trades, including the common laborers. The unions told the contractors that if this was not done, thus recognizing the common laborers union, the building trades unions would not furnish skilled workmen on future contracts.

The unions insist that this walkout of 1400 craftsmen is not a strike but a united action of affected workers who are using this means to protest the use of nonunion workers on certain jobs. This is the same argument, over the same issue, the unions advanced in their recent strike on the San Felipe Courts government housing project at Houston and other recent strikes.

Construction work at the Sheffield Steel Corporation is under the direction of Arthur G. McKee & Company of Cleveland, prime contractors on the project. The W. S. Bellows Construction Company is the subcontractor on the job whose employment of 30 nonunion truck drivers and unskilled laborers precipitated the strike.

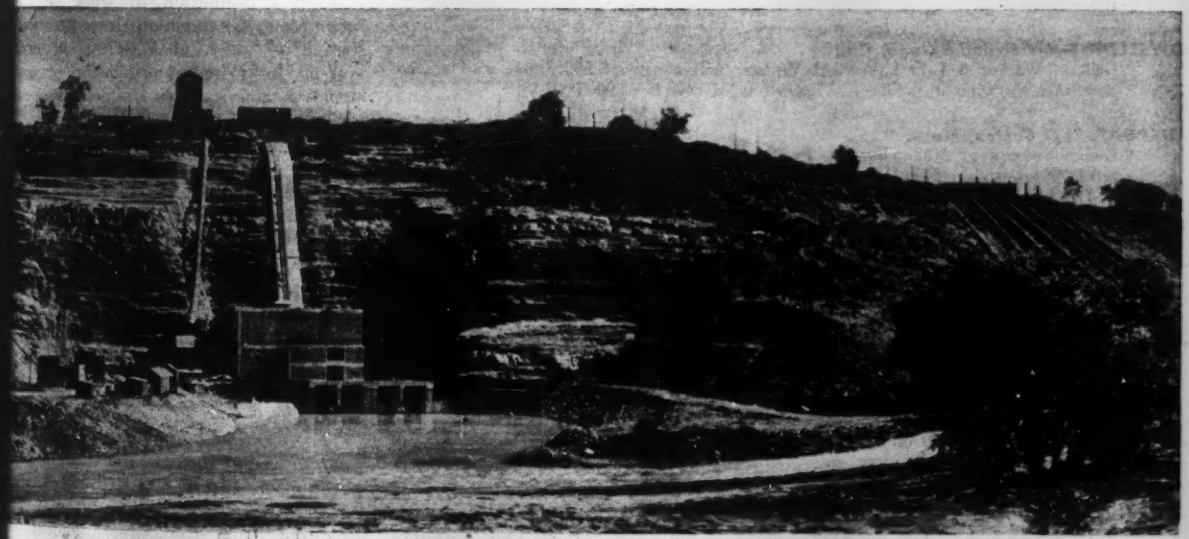
Texas State Labor Commissioner John D. Reed arrived in Houston October 19 in response to a telegram from the Associated General Contractors of Houston, asking him to investigate the strike. The contractors stated that the strike was a violation of the "no strike" pledge these and other unions gave Governor Stevenson on March 2—that labor would not indulge in strikes or work stoppages and the governor would not interfere with labor for the duration.

. . .

A.S.C.E. adds four men to honorary membership

Election of four men to honorary membership in the Amercian Society of Civil Engineers was announced by the board of direction on Nov. 1. The men so honored are Edward H. Connor, vice president and consulting engineer of the Missouri Valley Bridge & Iron Co., Leavenworth, Kan.; Frank T. Crowe, general superintendent on Shasta Dam for Pacific Constructors Inc.; Thomas H. MacDonald, commissioner, Public Roads Administration, Washington, D. C.; and Gerard B. Matthes, director, U. S. Waterways Experiment Station, Vicksburg, Miss .

Honorary membership will be conferred on these men at the annual meeting of the society in January.



ld and new power stations at De Cew Falls, Ontario. The new station (left center) ultimately will be expanded to permit abandonment of e old station, the penstocks for which can be seen at the far right. A large amount of rock excavation at the face of the Niagara escarpnt was involved in building the new station. The head on the new plant is 265 ft.

JOBS OF THE WEEK

APARTMENTS, Marietta, Ga.
A. Farnell Blair, Decatur, Ga., has been awarded a contract for 135 apartments to be known as the Pine Forest Apartments. The estimated cost is $2,000,000. The owner can be addressed, care of contractor.

BUILDINGS, Boundary Bay, B. C.
Bennett & White Construction Co., Ltd., Vancouver, has been awarded a contract by the Department of Munitions & Supplies, Ottawa, Ont., for sixteen buildings to cost $630,000.

HOSPITAL, Ste. Anne de Bellevue, Que.
Department of Public Works, Ottawa, Ont., will construct mental and infirmary building at Military Hospital here. Cost will be $669,000. Contract has been awarded to Concrete Construction Co., Ltd., Montreal, Que. C. D. Sutherland, c/o owner, is engineer.

DWELLINGS, Berkeley-Albany, Calif.
Moore & Roberts, San Francisco, Calif., have been awarded a contract for 1,896 family dwelling units on Gill Tract, by the Public Housing Authority, San Francisco, at $2,884,589. T. L. Pflueger, San Francisco, and Carl F. Gromme, San Rafael, are the architects. E. Elmore Hutchinson, San Francisco, is the engineer.

HARBOR DEVELOPMENT, Monongahela Township, Pa.
H. C. Frick Coal & Coke Co., Pittsburgh, Pa., awarded a contract for harbor development to Dravo Corp., Pittsburgh, Pa. The total project, which will include a coal tipple and a water filtration plant of 1,000,000 gal. capacity, will cost about $5,500,000. Walter Housman, Pittsburgh, is the company's chief engineer.

HOUSING, Oakland, Calif.
Standard Building Co., San Francisco, Calif., has been awarded a contract for 1,000 family dwellings by the Public Housing Authority, San Francisco, at $1,358,196. John J. Donovan, Berkeley, is the architect.

BUILDINGS, California
Ford J. Twaits and Morrison Knudsen Co., San Francisco, Calif., have been awarded a contract by the U. S. Engineers Office, San Francisco, for additional housing in Northern California. The cost will exceed $750,000.

DWELLINGS, Portland, Ore.
Meyers Brothers, Los Angeles, Calif., will construct 243 defense dwellings, near here. Work will be done by owner's forces. The cost is estimated at $1,385,300.

DWELLINGS, Baltimore, Md.
Du Pont Manor, Inc., Baltimore, Md., will construct 234 one-family dwellings by its own forces. The estimated cost is $700,000. Jerome Kahn, Baltimore, Md., is the architect.

DWELLINGS, Lakewood Village, Calif.
Griffith, Walker & Lee, Lakewood Village, will construct 800 frame and stucco dwellings, by their own forces. The estimated cost is $2,000,000.

AIRPORT, East Boston, Mass.
Commonwealth of Massachusetts, Public Works, Div. Waterways, Boston, Mass., received lowest bid from Atlantic, Gulf & Pacific Co., New York, N. Y., for filling and dredging to expand the General Logan airport, at $6,020,000.

Note—Additional bidding and contract news on many projects large and small appear in the Construction News section beginning on page 70.

Court upholds city in hiring consultants

The right of New York City to hire outside engineering firms to do engineering and architectural work in connection with the city's planning for postwar construction was upheld by the Supreme Court of the State of New York in a decision rendered on Oct. 13. The decision was in a suit brought by the Civil Service Technical Guild to have the court nullify existing contracts for such work and restrain the city from letting other contracts (*ENR* July 15, p. 124). The guild claimed that engagement of outside firms for this work was in contravention of the civil service sections of the state constitution.

In his decision Justice Pecora of the Supreme Court said: "I conclude that nothing contained in the Constitution of the State of New York or in the provisions of the Civil Service Law prohibits the City of New York from awarding contracts for architectural and engineering services to private concerns in connection with the postwar planning program. This court further holds that the action of the city attacked herein is in line with sound public policy and represents a wise exercise of discretion. The application, therefore, is in all respects denied, and the petition dismissed."

This decision can be carried to the appellate division of the court for review.

• • •

Drainage tunnel expected to revive Leadville area

Plans for the construction of a main tunnel 11,326 feet in length and two laterals totaling 5,856 feet to drain the rich Leadville mining district of Colorado, permit the reopening of scores of flooded mines and clear the way for possible production of 3,000,000 tons of zinc-lead ores and 1,000,000 tons of manganese ores for the war, were announced Oct. 27 by Secretary Ickes.

Idle since 1933, because of flooding, the workings cover an area of about eight square miles in Leadville.

Undertaken by the Bureau of Mines pursuant to an Act of Congress appropriating $1,400,000 for this great drainage project, the opening of the flooded region is expected to result in the ultimate recovery of ores containing metals variously valued at $200,000,000.

This project is similar to the Carlton tunnel at Cripple Creek, Colo., driven by the Golden Cycle Corp. three years ago (*ENR* Nov. 7, 1940, p. 618).

• • •

Guatemala to finish road as Pan-American link

President General Jorge Ubico has ordered continuation of work on the incomplete Guatemalan Inter-American section of the Pan-American highway system, following a suspension of construction activities by United States engineers, it was disclosed Oct. 31.

The work will be done, Ubico decided, through Guatemalan effort, but according to the original specifications to permit linking the highway with the El Salvador, Honduras and Nicaraguan sections. This will leave only the sections in Costa Rica and Panama incomplete.

• • •

Lumber Specifications from Supt. of Documents

The "National Emergency Specifications for the Design, Fabrication and Erection of Stress Grade Lumber and its Fastenings for Buildings" may be procured from the Superintendent of Documents, Washington, D. C. for 15 cents. This corrects an address given in ENR Oct. 21, p. 579.

OBITUARY

John W. Ford, Sr., 79, of New Orleans, ..., for many years a civil engineer with ... Southern Pacific lines, and later en...neer for the sewerage and water board ... New Orleans died Oct. 15 at Balti...ore, Md.

Robert H. E. Elliott, 85, retired ...under of R. H. E. Elliott, Inc., build...g contractors, of New York City, died ...ere Oct. 29.

George Arthur Eynon, 53, a contract...g engineer died at Alliance, Ohio, ...t. 22.

Frederick J. Prindle, construction en...neer who had just completed 54 years ...rvice at the Cleveland plant of the ...arner & Swasey Co., died recently. He ...ared in the design and construction of ...e Yerkes observatory and telescope at ...e University of Chicago.

Lucien Brousseau, maintenance of way ...gineer for the Central Region of the ...anadian National Rys., died at Toronto, ...nt., Oct. 20. He had been district engi...er for the railroad at Quebec for 20 ...ars.

O. L. Wilkirson, 88, who helped sur...y and develop much West Texas land, ...ed at Dallas on Oct. 6.

Alexander R. Mann, 84, a veteran of ...ilway construction in Canada, died at ...ancouver, B. C., Oct. 26. Mr. Mann ...d his associates in the Northern Con...truction Co., Ltd., and other firms, com...leted projects valued at almost $200,...00,000 which were spread from the ...acific coast to the Maritimes and into ...ewfoundland and the United States. In his long career he directed the laying of more than 5,000 miles of railway roadbed.

James W. Wilson, 55, civil engineer, died Oct. 20 in Oakland, Calif. He was vice-president of J. W. Wilson and Co., Oakland engineers and was particularly known for his designs of residential districts.

L. S. Cates, 53, former assistant district engineer of the Iowa highway commission at Cedar Rapids, and former Guthrie county, Ia., engineer, died recently at his home in Detroit, Mich.

News of the Week
Continued on p. 125

CONTRACTS AND CAPITAL

CIVIL ENGINEERING construction volume in continental U. S. totals $35,206,000 for the short week due to the Election Day holiday. This volume, not including the construction by military engineers abroad, American contracts outside the country, and shipbuilding, is 74 percent lower than in the corresponding 1942 week, but tops the $31,985,000 reported for the preceding week.

Private construction for the week, $15,388,000, gains 81 percent over the 1942 week's volume. Public work, however, is 85 percent below a year ago as a result of the 68 percent decline in state and municipal construction, and the 85 percent decrease in federal work.

The current week's construction brings 1943 volume to $2,716,958,000, an average of $61,749,000 for each of the 44 weeks of the period. On the weekly average basis, 1943 construction is 67 percent lower than the $8,461,997,000 reported for the 45-week 1942 period. Private construction, $392,292,000, is down 23 percent, and public construction, $2,324,666,000, is 70 percent lower than a year ago, when adjusted for the difference in the number of weeks.

In the classified construction groups, gains over the holiday-shortened 1942 weeks are in bridges, and commercial buildings. Increases over last week are in bridges, commercial buildings, and unclassified engineering construction.

New capital for construction purposes for the week totals $377,000, and is made up entirely of state and municipal bond sales. New construction financing for the 44 weeks of 1943, $3,043,627,000, is 67 percent lower than the $9,557,260,000 reported for the 45-week period last year.

CONTRACTS

Continental U. S. Only
(Thousands of dollars)

	Week Ending Nov. 5 1942	Oct. 28 1943	Nov. 4 1943
Federal	$125,040	$23,780	$18,592
State & Municipal	3,868	3,777	1,226
Total public	$128,908	$27,557	$19,818
Total private	8,504	4,428	15,388
TOTAL	$137,412	$31,985	$35,206
Cumulative 1943 (44 weeks)			$2,716,958
Cumulative 1942 (45 weeks)			$8,461,997

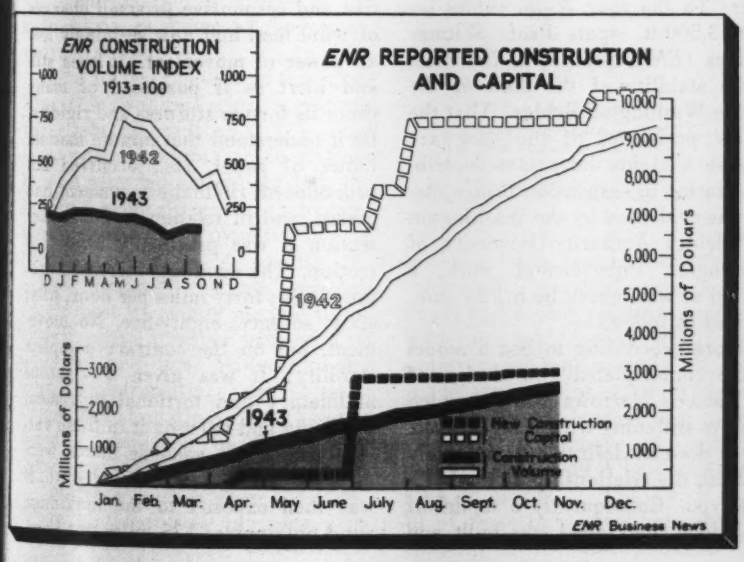
Note: Minimum size projects included are: Waterworks and waterways projects, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

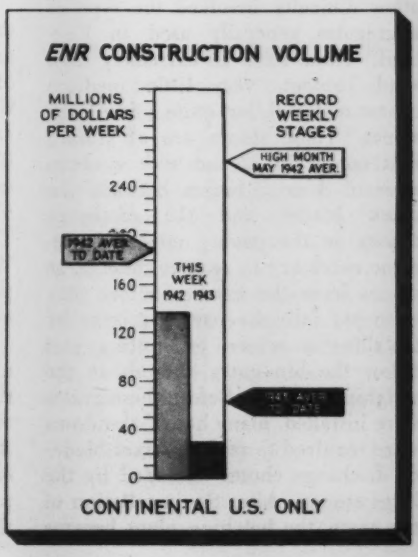
NEW PRODUCTIVE CAPITAL

	Cumulative 1942 45 weeks	1943 44 weeks
NON-FEDERAL	$590,362	$289,789
Corp. Securities	170,489	18,228
State & Mun.	206,718	105,883
R.F.C. loans	130,455	14,545
FPHA loans	.....	3,133
R.E.A. loans	.....	20,000
Fed.-Aid Hwy.	82,700	128,000
FEDERAL	$8,966,898	$2,753,838
TOTAL CAPITAL	$9,557,260	$3,043,627

ENR INDEX NUMBERS

Index Base=100		1913	1926
Construction Cost	Nov. '43	294.41	141.52
Building Cost	Nov. '43	231.39	125.08
Volume	Oct. '43	142	62


ENR CONSTRUCTION VOLUME INDEX 1913=100
1942
1943
D J F M A M J J A S O N D
ENR REPORTED CONSTRUCTION AND CAPITAL
Millions of Dollars
1942
1943
New Construction Capital
Construction Volume
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
ENR Business News



Comment and Discussion

Readers' opinions on matters that concern engineers and contractors

Batching and Finishing for Two Pavers

Sir: In your article, "Bases for Bombing from Britain," *ENR*, Aug. 12, 1943, the statement that the finishing and batching facilities on one job could not cope with the concreting pace set by two 34-E pavers dumping into the same runway strip is, I think, in error. After discussing it with Paul J. Wolfert, of our organization, who has just returned from a 90-day assignment as expert consultant with the Army Engineers in the European Theatre of Operations, I feel that you were either misinformed or were not given sufficient information.

With regard to the finishing machine, Mr. Wolfert states that on no project did the finishing machine retard the paving operation, or show itself incapable of keeping up with whatever combinations of pavers were used. We know definitely from our experience on domestic work that the Blaw-Knox finishing machine will handle the output of two paving mixers with real efficiency.

With regard to batching, conditions were sometimes encountered which made it impossible to utilize the full capacity of the plants. One of these was insufficient clamshell capacity to keep the bins full. Another difficulty involved the type of aggregates generally used in England. These have an extremely high sand content, very little medium coarse material, but quite a few large stones. These stones are of a hard flint composition, and with a clearance of 4 or 5 inches between the drum blades and the discharge chutes on the paving mixers it became necessary to remove these large stones from the batches before they were put into the paving mixers by installing a screen or grating just below the bin gates and above the weighing hopper. Before these grates were installed, many hours' shutdown were required to replace mixer blades or discharge chutes damaged by the large stones. After the installation of the grate, the batching plant became a combination screening and batching plant, but this greatly cut down its output.

Assuming that the supply of material in the overhead bin is adequate, and that trucks can pass through beneath the bin at normal speed, a batching plant of the type you saw on the English work is capable of servicing three 34-E single drum paving mixers, each of which is capable of turning out a batch of mixed concrete every minute.

A. E. HOHMAN
Blaw-Knox Company
Pittsburgh, Pa.

Note: Mr. Hohman's criticism of the wording of the statement is justified. There were many conditions that developed in the European theatre of operations that required equipment to be used in an unorthodox manner. The description of the manner of use of the batching equipment makes this evident, and Mr. Wolfert's explanation is undoubtedly true. The conditions of use, rather than the capacity of the equipment, were the controlling factors in the rate of production.—Editor.

Streamlined bridge decks

Sir: To the four 36-in. cables on their 3,500-ft. span Prof. Witmer ascribes (*ENR*, Sept. 9, p. 76) most of the stability of the deck of the George Washington Bridge. That the airflow properties of the deck are likewise a highly important contributing factor in suspension bridge stability is evidenced by the Washington Toll Bridge Authority-University of Washington experimental work, a portion of which may be briefly summarized as follows:

Before proceeding to test a model of the contemplated new design of the Tacoma Narrows Bridge, which employs stiffening trusses 33 ft. deep, it was deemed desirable to definitely establish the relationship of model to prototype. Consequently a model of the bridge that failed was built and tested, which bridge, be it observed, had been wholly satisfactory with respect to traffic loading. Models are all 100 ft. long and they are subjected to equal wind loads throughout their length. The steelwork of the original deck was reproduced to scale —8 ft. marginal stiffening girders, floor beams, stringers and wind trusses—but the floor slab and sidewalks were omitted. This model lacked 20 percent of the stabilizing weight of the prototype but had whatever benefit—perhaps none—that is contributed by open skeleton framing. It was tested with and without midspan diagonal stays.

Without stays and subjected to winds of various low velocities it quite closely reproduced the vertical undulations of the prototype and tortional movements as well. At about a 30-mile wind the action became so violent that if permitted to continue the model would have torn itself to pieces. Therefore this test was discontinued at this point.

Then without changing the structural framing in any manner the cross-section of the deck was altered. The top was closed by a sheet of heavy paper extending from the top of one stiffening girder to the other for the full 100-ft. length, the bottom was similarly closed and each girder was provided with semi-circular paper nosing on its outer side. In other words the section was converted to that of an elongated rectangle with rounded ends.

Exposed to the wind stream, an extraordinary transformation was evidenced. That which had been an extremely flexible, mobile deck, sensitive and responsive to small changes of wind load had now seemingly lost all power of movement. It hung still and inert as if possessed of many times its former stiffness and rigidity. Be it understood that minute motion, flutter of paper, etc., occurred but pronounced, rhythmic movement had ceased, and in relation to the former section it was practically devoid of motion. The wind was increased progressively: forty miles per hour, fifty, sixty, seventy, eighty-five. No movement, but on the contrary complete stability! It was given a vigorous undulatory and tortional movement by lifting and twisting it in these various winds. As soon as hands were removed the movement died out! It was then exposed to the maximum wind obtainable: 125 miles per hour.

it hung without motion, steady and unyielding! Only by imparting it, could sustained and continuing movement in this 125-mile wind be set up.

This remarkable change in stability was effected, not by increasing the number and diameter of the cables, not by increasing the depth or moment of inertia of the stiffening members, not by significantly increasing the weight, but by drastically reducing vertical and horizontal wind loads, such being the consequence of the paper fairing.

Since the desirable section for airflow can be simply and inexpensively obtained in various ways and since engineering is interested in doing things economically, it would appear to the writer altogether probable that shallow streamlined decks would presently become a preferred form for suspension bridges.

HOMER M. HADLEY,
Regional Structural Engineer
Portland Cement Association
Seattle, Wash.

Column Design in Question

Sir: Common to every published formula I have seen for solving "cracked," reinforced-concrete columns, is the arbitrary assumption of a straight line strain diagram in the final result. To this assumption, other factors in the problem are made to conform. If the straight line strain diagram holds for a reinforced-concrete section under pure bending, I submit the proposition, that for a "cracked," reinforced-concrete section under bending and axial load, the strain diagram is broken at the neutral axis, as shown by the accompanying sketch.

There are two elements in this problem: (1) Bending, which produces one strain diagram and, (2) axial load, which produces another. Both may be regarded as straight but, the two lines being divergent, their combined effects must resolve into a broken line.

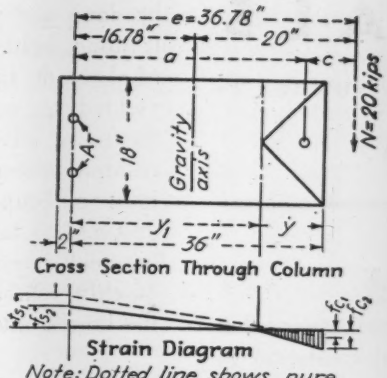
The "cracked" column problem occurs most frequently in rigid frame analysis where member sizes are first estimated and then analyzed under load. Supplementing my article: "Simplified Equations for Concrete Beams," published in *Engineering News-Record*, Sept. 9, 1943, p. 388, my object here is to show the application of the section modulus principle to analysis of the eccentrically loaded column, that is, the "cracked" column. My equations apply to both singly and doubly reinforced sections. With no compression steel, A_c is simply given zero value in all forms.

The method of transferring the axial load to the tension steel appears in several text books and was featured in Prof. Odd Albert's article in *ENR* of March 11, 1943, p. 365, but all of these treatments are geared to the straight line strain diagram. The straight line diagram does, of course, hold for homogeneous materials such as steel sections under all conditions of loading but not in the special case of the "cracked," reinforced-concrete column. The error under-rates concrete stresses.

The analysis procedure to follow when making reference to the drawing on this page and my Sept. 9 article is: (1) compute S_{t1} and S_{c1} for section "as is"; (2) from the moment about gravity axis, M_1, compute tension steel stress; (3) using this value, augment A_{t1} to compensate for assumed transfer of N to tension steel; (4) with this new value, A_{t2}, compute new section modulus values, S_{c2} and S_{t2}; (5) with these section modulus values compute new compression and tension stresses, f_{c2} and f_{s2}, using the moment of N about the tension steel, M_2; (6) multiply f_{s2} by A_{t2} for total tension; and (7) from this deduct N. The result is the actual total tension. This value divided by actual A_{t1} gives the actual steel stress. Actual compression stress, f_{c2}, remains as found.

Any attempt to reconcile a straight line strain diagram with this case gives absurd maladjustments. The stress values here are not typical of normal practice, but the mathematical principles hold as well for normal cases. By demonstrating the trend, this example proves the fallacy of the straight line strain diagram for "cracked," reinforced-concrete sections under bending and axial load.

J. F. P. TATE,
Structural Engineer
New York, N. Y.



Note: Dotted line shows pure bending and full line shows bending and compression

For a "cracked" section under bending and axial load, the strain diagram is broken at the neutral axis.

ANALYSIS DATA FOR EXAMPLE SHOWN IN SKETCH

	Phase I Section "As Is"	Phase II Augmented Section
A_t	0.6 sq. in.	1.627 sq. in.
y	5.521 in.	8.617 in.
S_c	1697 in.³	2569 in.³
S_t	20.50 in.³	53.9 in.³
M	400 Kip-in.	735.60 Kip-in.
f_c	0.236 Kips per sq. in.	0.286 Kips per sq. in.
f_t	19.477 Kips per sq. in.	13.647 Kips per sq. in.
a	34.16 in.	33.13 in.
Total Comp.	11.706 Kips	+22.205 Kips
Total Tens.	11.706 Kips	−22.205 Kips +20.000 Kips = N
	Net =	−2.205 Kips

Note: n is taken as 15

Final stresses

$f_c = 0.286$ Kips per sq. in.

$f_t = \frac{2.205}{0.60} = 3.67$ Kips per sq. in

Equilibrium

C_c = Total compression = 22.205 Kips
T_t = Total tension = 2.205 Kips
$\bar{a}_{33}$ = 33.13 in. C = 3.65 in.
NC = T_t $a_{\bar{a}}$ = 73.0 inch — Kips
C_c $a_{\bar{a}}$ = Ne = 735.6 inch — Kips

Caulking Timber Barges

Sir: The article "Timber Barges Built for Easy Assembly" in your issue of Aug. 12, 1943, p. 109, has led some readers to assume that *all* field caulking was eliminated. This is not the case. Only on certain portions of the barge was it possible to wholly eliminate caulking.

In our design, gunwale strakes are milled with exterior caulking joints at seams and butts, through-bolted with ⅞-in. bolts and ring connected, strake to strake, on 3-ft. centers and at butt joints.

Incidentally, our splines are ¾x1½ in., not ¾x½ as shown.

CLYDE E. MURRAY,
Structural Engineer,
Henry Mill & Timber Co.

EDITORIALS

VOLUME 131 NUMBER 19

November 4, 1943

A Tip From the Horse's Mouth

ONE OF THE MOST TANGIBLE contributions that has yet been made toward the implementation of postwar planning comes from a group of manufacturers. Invited to participate in a symposium devoted to the advancement of a postwar sanitation program, the Water and Sewage Works Manufacturers' Association made a survey of its membership regarding the type and specifications of equipment that would be available after the war. On the basis of this survey, the manufacturers were able to give the engineers and municipal officials attending the Federation of Sewage Works Associations conference some vital information. In brief, it was this: Anyone who wants to design postwar sewage works can use prewar catalogs and specifications of products with assurance that there will be virtually no change in the products when the war is over. Furthermore, in the case of two radically new products that are to be put on the market, it was stated that the manufacturers already have supplied design data to engineers and potential users. Thus, the manufacturers in the sewage treatment equipment field disposed of the bugaboo that the postwar period would usher in a dream world outmoding all that existed in the past. Coming directly "from the horse's mouth", this tip should go a long way toward stimulating advance design preparation of sanitation projects.

Structural Welding Knowledge

AVAILABLE LITERATURE on electric welding gives scant information on (1) how to lay out a sequence program of weld deposition, (2) how to classify the types of work suitable for automatic machine welding, and (3) how to minimize locked-up stresses when thick plates have to be welded manually. All of these problems confronted the welding engineers of a shipyard recently, and required an extensive research program for their solution. The methods and results of this program are described in an article in this issue, giving valuable new information on the manual welding of thick plates particularly. More such research needs to be done and published. The simple problems of training welders, of qualification tests, of choice of electrode and of joint strength tests have already yielded to research and experience. It is now the more advanced and specialized questions of residual stresses, fatigue values and complicated joint makeup that need attention. Welding is destined to take an increasingly important place in steel construction, hence the importance of quickly establishing correct procedures for even the largest and most complicated of structures.

Construction for the Navy

NAVY DAY and a week devoted to press releases on Navy activities have singularly omitted deserved emphasis on the work of the Bureau of Yards and Docks, the civil engineering and construction branch of the Navy. Yet this organization has supervised, or with its own forces designed and constructed, all of our facilities for shore stations and for Naval ship construction and repair throughout the world. The work has been well and rapidly done, with many almost unbelievable achievements. Fast construction of an airfield at Midway Island and a graving dock at Pearl Harbor, for example, was instrumental in turning the Pacific war in our favor after a disastrous beginning. Credit for the accomplishments rests with regular and reserve officers of the Civil Engineer Corps, with civilian contractors, with countless enlisted men and petty officers of the new but now battle-tested Seabees, and, of course, with Rear Admiral Ben Moreell, chief of the bureau. Navy Day, this year, was a day for the construction industry to celebrate, too.

Developments in Paint

IMPORTANT DEVELOPMENTS in paint pigments and paint vehicles have been taking place during recent years without receiving the attention that was due them except among the paint producers. Other developments now are in the making due to the research into substitute materials that has been forced upon the paint industry by shortages of certain materials normally used in paint, such as tung oil. Many of these changes are of significance to the civil engineering and construction field because they have already provided, or promise to provide new paints or modifications of old ones with better wearing qualities. To make this information available, the first of a series of articles on the major types of pigments and vehicles is published in this issue. Others will follow from time to time, the objective being to acquaint the user

with the variety of paints that will be available after the war to meet varying conditions and to make it possible for him to specify more accurately the qualities he needs in a particular paint.

Engineering Employees Aided

ACTION OF SIGNIFICANCE to many engineering employees was taken by the board of direction of the American Society of Civil Engineers at its recent meeting in Atlanta when it laid the groundwork for the setting up of local bargaining units to represent engineering employees who may prefer such representation to that of one of the established trade unions (*ENR* Oct. 30, p. 645).

Long under consideration, the board's action was brought to a head by the recent refusal of a War Labor Board panel at Kansas City to recognize a group of about 100 engineers as a separate bargaining unit at the Sunflower Ordnance Plant. The reason given for the refusal was that the International Federation of Technical Engineers, Architects and Draftsmen's Unions had been recognized for nearly a year as spokesman for technical men on the job. Inferentially, it could be assumed from the panel's finding that the engineers' group would have been entitled to separate representation had it acted when the matter of representation first was under consideration. The action taken by the A.S.C.E. board at Atlanta is intended to facilitate prompt submission of such applications for separate recognition.

DOUBTLESS THIS ACTION by the A.S.C.E. board will be characterized by some as anti-union, and hence a destructive rather than a constructive move. In fairness, it cannot be so characterized. It is anti-union to the extent that its object is to keep men from being forced to join a union or to accept representation by union officials against their will. In this the board's action is in defense of one of the fundamental rights guaranteed by the Constitution but now temporarily eclipsed due to questionable provisions of the labor laws and some inequitable interpretations of those laws.

Meanwhile engineers who do not wish to be represented by unions in which the professionally minded engineers would be but a small minority need some organization or organizations of their own choosing to speak for them and establish their rights on a par with men in the unions when matters relating to employment conditions are under discussion. The Sunflower Ordnance Plant case is but an isolated example of what is happening or may happen in many other places as a corollary to the increase in collective bargaining that is inevitable under existing laws. The A.S.C.E. has attempted to meet this need. Its action, therefore is constructive.

FOR CORRECT PERSPECTIVE, the A.S.C.E. board action with respect to collective bargaining needs to be viewed in connection with its less spectacular action directed toward securing better compensation for engineering employees. Ready for adoption except for some minor clarification of the wording is a complete range of salary scales that has been under study by the board's committee on salaries for some years past. Salary schedules for some of the lower classifications were approved in 1939; the schedule now nearing completion extends the range right up to chief engineer. Unofficially, the wage scales in this schedule have been used as a guide in several recent cases where pay rates were being determined for government work.

Within a few months the civil engineering and construction field will have a complete schedule of salaries approved by the A.S.C.E. It also will have within each section of the A.S.C.E. the machinery for collective bargaining on a level that will be acceptable to men who are opposed to the coercive tactics generally adopted by trade unions. When that set-up is complete, even small groups of engineers whose compensation or working conditions are not in harmony with the A.S.C.E. schedules can get their case heard by professional men. Heretofore, those working for hardboiled employers have had no recourse but a union. The very fact that the A.S.C.E. has such committees and soon will have an approved schedule of pay rates in itself will work to eliminate much of the low pay that has been all too characteristic of engineering work in the past.

THERE IS AMPLE EVIDENCE to show that most engineers in the professional grades do not want to affiliate with trade unions. By setting fair compensation schedules and by providing simple means for collective bargaining without affiliation with trade unions, the American Society of Civil Engineers has gone far toward making such affiliation unnecessary.

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ENGINEERING ABROAD AS SEEN BY ENR EDITORS

Mud, Straw, Bally Poles and Brick

Waldo G. Bowman
Editor, Engineering News-Record
(By Airmail from the Persian Gulf Service Command)

● Not only did our Army Engineers in Iran have to build and man the transport facilities in the Persian supply corridor, as described Oct. 7 in the article, "Beating a Path to Russia's Back Door," but they had to construct many types of buildings to make living and working easier and more efficient. Inevitably they had to embrace many ancient Persian practices, and to make full use of local materials. Both they and the Persians have often been surprised and pleased with the results.

IN CONTRAST to desert roadbuilding in Iran, where modern equipment pushed normal hand labor work out of the picture (*ENR*, Oct. 7, 1943, p. 520) the building of barracks, mess halls, warehouses and hospitals along these transportation arteries to Russia retained many of the ancient Persian practices and tools. Mortar and even concrete were mixed by a straight triangular shovel and carried in small dishpans by virtual caravans of workmen; saws were used that cut only on the backstroke; mud-straw brick were made by hand; laths about 2 ft. long were split from poles as if they were kindling, while straw mat roofs covered with mud were fashioned with no departures in technique from that used in ancient Babylon, which 3,000 years ago was just over the hill from the present Persian supply corridor. Moreover, brick, straw and round timber poles constitute the bulk of the enclosure and framing materials, supplemented by an American contribution in the form of salvaged packing box lumber. The resulting structures are comfortable and attractive, and have a much more substantial appearance than the majority of cantonment buildings in the United States.

The Army Engineer's use of local labor, indigenous methods and local materials made a virtue out of a necessity. Practically no American materials were available, and to educate the natives in the use of modern methods and tools was recognized as an impossibility. With respect to the latter, the story is told of how an American sergeant carefully instructed a group of natives on how to use a wheelbarrow only to find four of them carrying it from place to place ten minutes later. Brick are tossed up to the mason one at a time, and other materials are carried on top of the head.

The mud brick, made right beside the building into which they are to be laid (incidentally creating holes in the ground that the natives never think of filling up) are 8x8x2 in., and may be used after 3 days drying, although a 14-day period produces a better product. Burned brick, about 2½x4½x9 in., are only slightly harder than the mud brick, but are preferred on the American construction for this reason. In the north, where brick making material is scarce, we follow the native practice of using stone. Mortar is often only the mud-straw mixture, but where good joints are required a material resembling plaster of paris, and known as gach, is used. So rapidly does this set that the natives build arched door and window lintels without any centering whatever.

In addition to masonry, the other material characteristic of Iranian building practice is the round timber known as bally poles. Consisting of the trunks of a poplar-like tree, and varying in diameter from 2 to 8 in. (and of course tapering in size from butt to top), bally poles are used for columns, beams, rafters, purlins and, indeed, for any and all types of framing. They are not by any means straight, and it is something of an art to select and install them properly.

Using these two materials, brick and poles, Army Engineer architects have done an outstanding job of designing. And it is not a small program which they have had to carry out, as is evident from the fact that it has so far included nearly 800 barracks, 170 mess halls, dozens of officers quarters, and hospitals, and over 1,300 miscellaneous structures. These buildings are required in the port industrial areas, at camps along the railroad and highway, at motor repair depots, at a rest camp in the mountains and at hospitalization sites. Descriptions of a number of them will serve to emphasize the character of one of the most unusual building programs that has come out of our war effort.

A typical barracks building is about 20x60 ft. Concrete floors are used, and the walls are a double (16 in.) thickness of brick. The hipped roof is made of bally poles with horizontal bally poleties at the top of the

lls. Since the 4 in. dia. poles, which the most common size, are seldom ilable in more than 14 ft. lengths, of them have to be spliced to- her to make members long enough this roof construction; the splice, lap-type, is made by nails supple- nted by a wrapping of sheet metal aps salvaged from packing cases. If a mud roof is used, it may be pported on 4x8-ft. panels of reed tch board, 1½ in. thick (resem- ng heavy baled straw), which per- ts rafters to be spaced 18 in. on nters, or it may be carried by thin lm frond mats or chattis, which nits the rafter spacing to about n. The mud placed on these roofs given a prime and finish coat of umen as waterproofing.

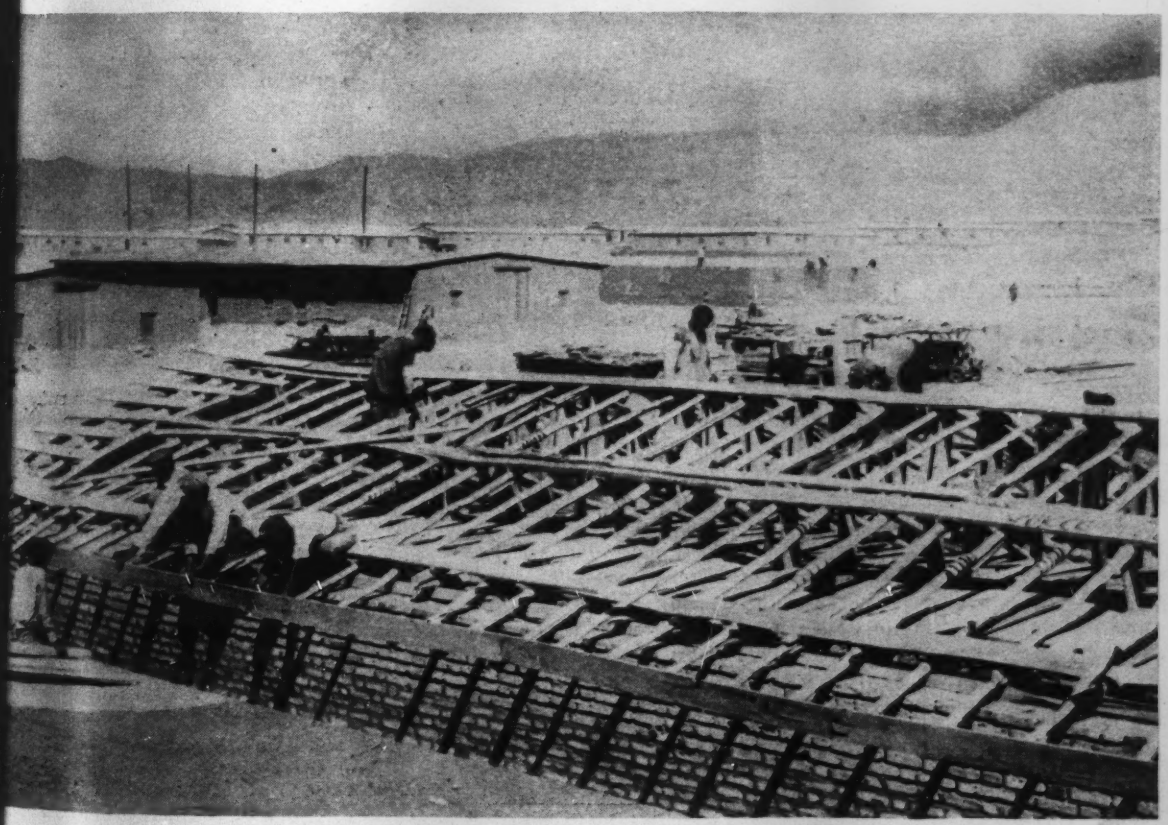
Inasmuch as the mud on such a of requires rather heavy construc- n to support it, we are now begin- g to use packing case lumber deck- g covered with asphalt roofing, a ange in design that came only after Engineers went into virtual part- rship with a local manufacturer. e supply hessian cloth for the roof- g fabric and, using mechanical in- genuity uncommon in Iran, the manufacturer turns out a mineral surface product that is quite satisfactory. The rollers that apply the asphalt are hand-operated, and the sand is dusted on manually. An amusing contrast between the primitive and the modern is a sign over the stacks of finished roofing in this little backyard factory reading "Ready for Delivery to U. S. Army." At present the manufacturer, on his own initiative, is installing another production "line," which he says will come in handy not only now but after the war when he intends to revolutionize the Iranian roofing business. There is postwar planning in Iran too!

Underground storage warehouses

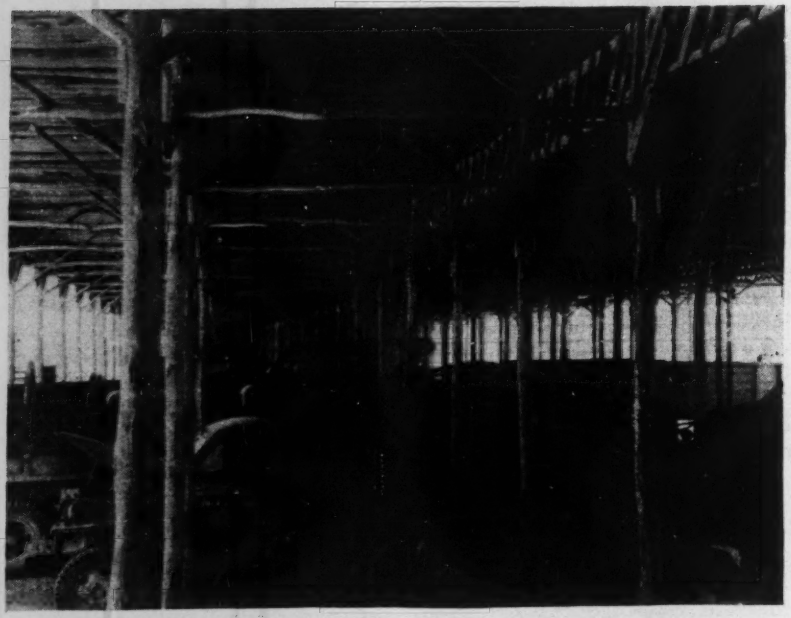
One of the interesting mud roof buildings is an underground storage warehouse for tires, which require protection from the excessive heat. Here the 1½-in. thatch boards are covered by 16 in. of loose dirt placed in four layers compacted by the feet of the workmen, while on top is placed a 2-in. layer of mud-straw. The tires are stacked in bally pole racks and a ramped roadway through the center of the building permits tires to be moved in and out readily.

The largest buildings in point of size are the truck maintenance and servicing shops established at intervals along the highway. Usually 75 ft. wide, one of them has a length of 750 ft. Framing consists of bally pole columns, longitudinal roof trusses of 25-ft. span and transverse bally pole roof beam of 15-ft. span. The trusses, giving a 15 ft. 9 in. clearance above the floor and made up of packing case lumber, are 2 ft. deep between their 2x6-in. chords and utilize a lattice web system of 1x4's. These buildings have no walls, their purpose being merely to provide a flat roof under which the maintenance men can work, protected from the sun. The roof itself consist of bally poles, thatch board and mud. Numerous chain hoists are required in these buildings, and these are carried on bally pole framing separate from that of the building.

Cold storage warehouses and ice plants occupy a place of high importance in the P.G.S.C. camps, and a



Warehouse construction at an American camp in northern Iran. The brick and bally poles are in evidence, while the d and straw will cover the roof. Note the bally pole splices wound with sheet metal straps salvaged from packing cases.



2. Truck maintenance shed in the Persian supply corridor. This one is 750 ft. long. All framing is of bally poles with the exception of the web members of the trusses, which are packing-case scrap from the truck or plane assembly plants.

3. Mud brick is a real "local" material, for it is made right on the job. An obvious disadvantage is that material has to be trucked in to fill the holes left by the brickmakers. Note the brick stacked on edge to dry.

design that will permit temperatures of 10 deg. below freezing inside when outside temperatures may be 150 deg. had to be developed. Quadruple walls, 4 ft. thick, are used, consisting of the following parts from inside to outside: 8-in. burned brick, 8-in. cork, 24-in. mud brick and 8-in. burned brick. In addition, the inside is plastered with gach, surfaced with bitumen.

The thermal efficiency thus provided in the walls is assured over the top of the building by using three separate roofs supported on the walls and bally pole columns. The first or inside roof consists of closely spaced bally pole purlins providing a deck for 8 in. of cork. Above a 6-in. dead air space, a second flat, bally pole deck is built and covered with chatti mats and 4 in. of mud. Finally, there is a gable roof of bally poles and 6 in. of mud. Floors consist of a 6-in. compacted fill, a 2-in. concrete subfloor, 6 in. of cork and a 4-in. concrete slab on top. The cold rooms of these structures are arranged in pairs either side of a wide central corridor which fans will keep at about 90 deg. so that the men who have to go in and out of the refrigerated rooms will not be subjected to the total inside-outside temperature differential.

Some of the installations do not warrant such heavy construction for cold storage structures and in such cases smaller subsistence buildings are placed under ground if the water table permits. The underground buildings use two 18-in. mud brick walls separated by a 3-in. air space and are plastered with mud and straw on the outside. A triple roof, as in the refrigerated buildings, is also used.

Special design saves utility supplies

The greatest building material difficulties in the P.G.S.C. arise from shortages of plumbing and electrical supplies, and constant attention is given to efficient use of those few that can be purchased on the local market. An outstanding result of this attention is the standard hospital design, which utilizes a star-shaped plan of five wings radiating from a central core in which all utilities are concentrated. This cuts down piping and wiring runs, and allows fewer toilet, wash and shower rooms than would be required in a normal layout. Another advantage of this design is that all offices and nurse stations are also grouped in the center core, which permits a minimum amount of personnel to handle a maximum number of patients. If one star-shaped building is not sufficient, another is built and joined to the first by a corridor. As many as four star units have been used in one hospital group.

One feature of the core arrangement of a star hospital is a small central open court in which running water and vegetation are maintained. Both psychologically and actually this has proved to have a cooling influence, which has been sought further in complete plastering of wards and rooms. The first coat is a mud plaster, a material which the natives make by carefully selecting the mud by taste (the proper ingredients being called "sweet earth") and mixing it with about 10 percent by weight of straw, which is allowed to stand two weeks before using, or until the straw is well rotted. Over this mud plaster the white gach plaster is applied, followed by a linseed oil prime and then by paint. It is in the ceilings of these buildings

hat the "kindling wood" lath, cut rom the bally poles, is used.

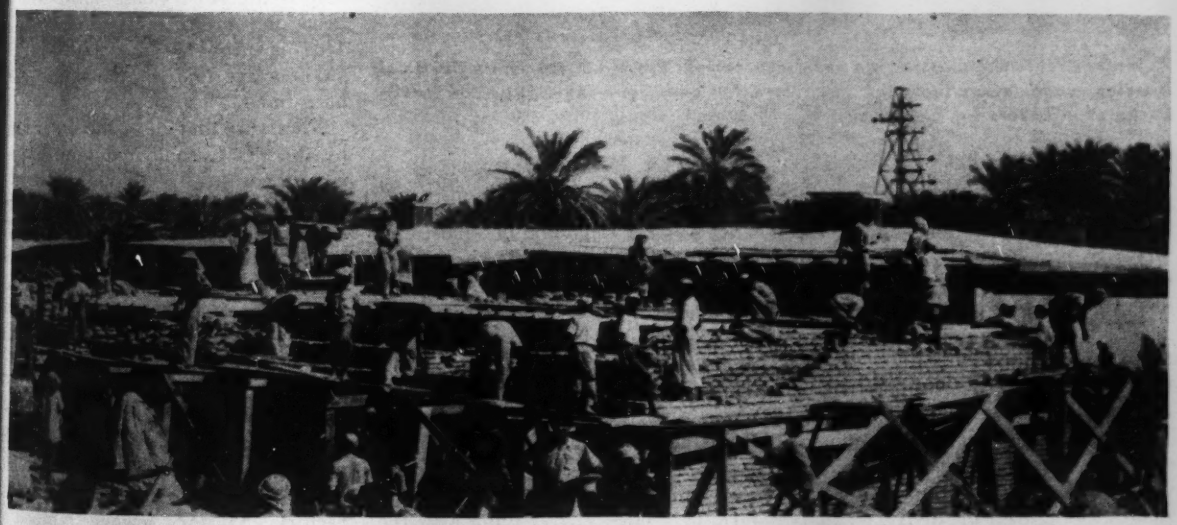
Solving the problem of safe water

Diverse and peculiar problems of water supply and sanitation have also ad to be solved in Persia, as would e expected in a country that varies rom desert to high mountains, and ne which has a native population hat regards water courses as combiation latrines, laundries, bath tubs nd drinking fountains. But Engineer and Sanitary Corps officers have ound solutions for these problems, nd of those of malaria control, to uch an extent that our troops are iving quite as safely and comfortably s they would in America.

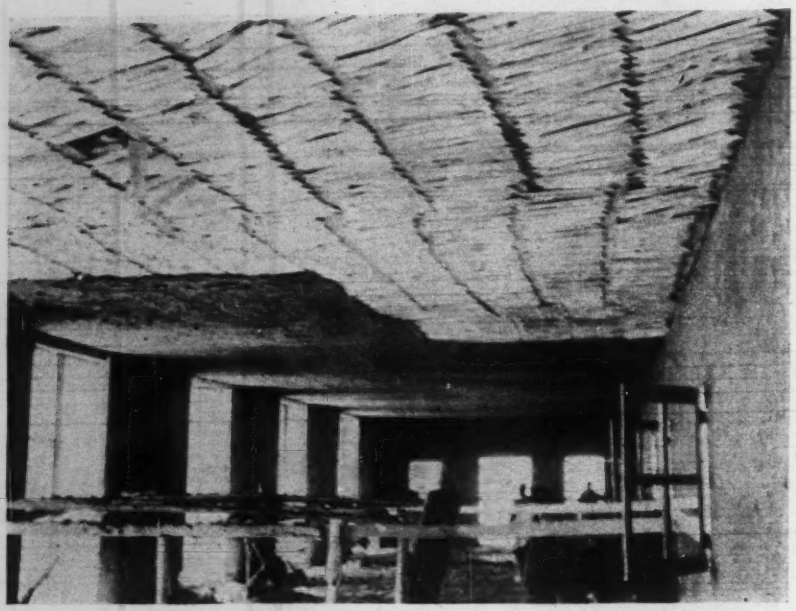
Persian towns near which our camps are established are for the most part on rivers, even in the desert. British water supply practice at these points had encompassed settling and chlorination but, because positive protection against amoebic dysentery could only be assured by heavy and therefore unpleasant dosages of chlorine, our engineers have added filtering. In most cases pressure filters are used, designed to treat 3 gal. per sq. ft. per min.; one of the largest installations is a 6-ft. dia. filter producing 100 g.p.m. All of these large installations have coagulation basins ahead of the filters.

The most significant water treatment practice, however, is the use of slow sand filtration at one of the larger desert installations. The decision to use this method, as an alternative to rapid sand filters for which equipment was not available, was based on the fact that, although highly turbid, the desert river waters clear up very rapidly. This plant has a capacity of 400,000 g.p.d., based on a design specification of 3 m.g. per acre per day, and being all under cover, presents a most modern appearance. The water is pumped from the river through 5½ mi. of 6-in. pipe on which frequent blowoffs have had to be installed to keep the line clear of mud. Settling tanks at the plant provide for a 11 hr. detention period prior to filtration. After filtering, the water is pumped to one 200,000-gal. and two 100,000-gal. reservoirs from which the camp is served. This installation has proved so successful that a second slow sand filter is being built at another camp.

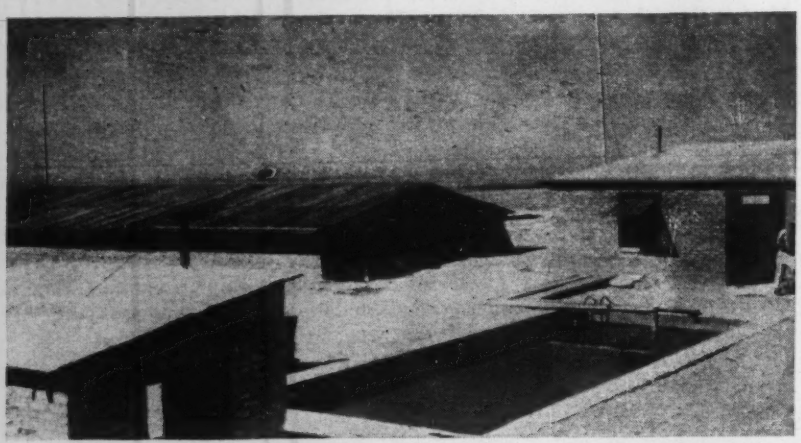
4. Boys under 15 yr. of age are the best workmen in Persia. This group of youngsters is starting a barracks building. The mortar is plain mud dug from a hole inside the building itself.



5. The walls of this cold storage plant are 4 ft. thick, but it would take just as many workmen if they were only 16 in. Construction wages in Iran are about 36c. a day.



6. Even lath is made from bally poles, cut into about 2-ft. lengths and split like kindling. Here a lathed ceiling of a hospital is being given its first coat of mud plaster. Over this a white quick-setting plaster will be placed.



7. Water treatment plant at an American camp. From left to right: Chemical building, coagulation tank and pressure filter building. The large roof in the background covers the clear-well.

At one of the main ports and at the town where the airplane assembly plant is located, safe and potable water is available from British rapid-sand filter plants. At another port, however, a major modernization program has had to be undertaken. Here the supply was a 30-mi. 6-in. line laid on top of the desert and equipped with inadequate pumping facilities. Two small filters turned out enough water for drinking, but the remainder was polluted and unsafe. Additional pumps, to increase the delivery capacity, and two pressure filters of 5 and 6-ft. dia., preceded by coagulation basins, were installed in August, so that this port, which has the questionable honor of having the most uncomfortable climate in Persia, is now reasonably habitable.

Perhaps the most interesting water installation, however, is at the headquarters camp where the supply is taken from one of the ancient Persian ghanats or tunnels that bring water from mountain springs out onto the desert to form artificial oases that may support anything from a single farm to a large city. Flying over the desert, one finds these ghanat lines plainly marked by small volcano-shaped mounds spaced about 200 ft apart, which are piles of spoil material taken from cleanout shafts.

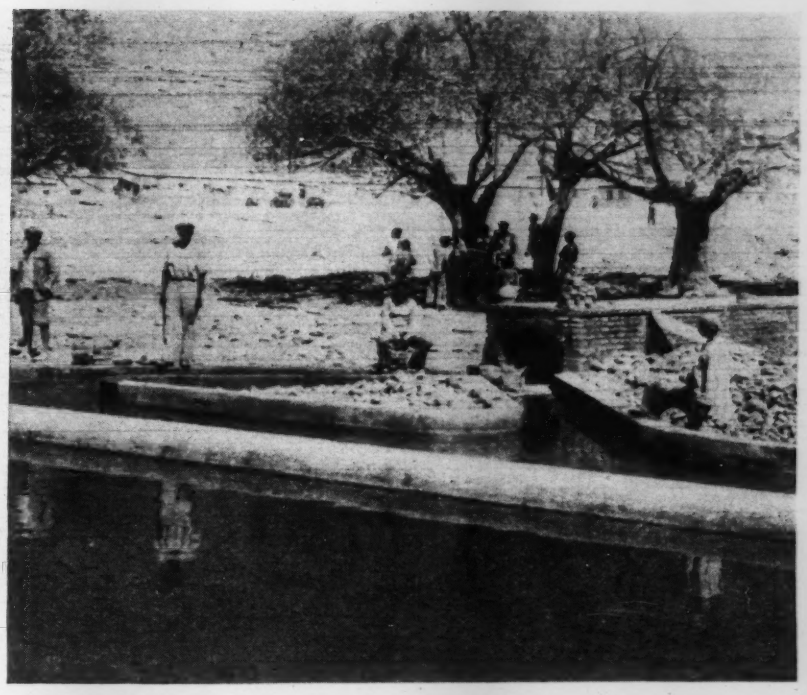
A ghanat line is started in the mountains by digging a vertical shaft to the source of the spring, then tunneling horizontally (with a very slight downgrade) from there until the ground surface (which of course slopes from mountain to desert) is reached. Here an irrigated spot will be established and another shaft and horizontal tunnel built to take the excess water farther down grade. A ghanat may run for many miles, coming to the surface dozens of times only to be turned back into the earth through shafts that may be as much as 100 ft deep. Ghanats are hand-mined and just big enough to accommodate a native workman in his characteristic squatting position.

At the headquarters camp several of these ghanats are brought together to discharge into a flume, off of which steel pipe conducts the water to alum and soda ash tanks and then into a coagulation basin. This basin feeds a filter plant made up of four 5-ft. dia. pressure filters. After filtration and chlorination part of the water passes into a 164,000-gal. reservoir at the plant to serve an upper camp area, while the remainder is discharged into a similar reservoir at 160 ft. lower elevation to feed the lower part of the camp. There is also a second reservoir at this lower elevation to which the ghanat brings raw water for laundry and other industrial uses. Where the ghanat traverses the camp area, it is not very deep and is therefore being lined with a brick arch to protect it from cave-ins. This is probably the first time in 2,000 years that a ghanat has ever been lined.

To assure that all of the water used by the PGSC shall maintain the purity theoretically provided by the treatment installations, three water analysis laboratories are being established. Daily samples are to be provided these labs so that any deterioration in water quality may be immediately detected and quickly remedied.

Sanitation and malaria control

Waste disposal is comparatively more primitive than water treatment, but is nevertheless reasonably satisfactory. Sanitary sewage is piped to septic tanks, which discharge their effluent through gravity lines at some



Water for many of our camps is supplied from the ancient Persian ghanats or tunnels that run down from the mountains. Left: Natives, using a primitive hoist drum, clean out a ghanat preparatory to lining it with brick. Right: Discharge of a ghanat into a battery of settling basins at one of our camps.

distance from the camps. Adequate in the mountains, this procedure has its drawbacks on the level desert. For such locations consideration is being given to collecting the effluent in sumps from which it can be force-pumped out into the desert far away from the living quarters.

Shower bath and kitchen water is passed through grease traps and discharged directly on the ground at reasonable distances from living quarters in the desert, thus approaching broad irrigation. In the mountains, however, the wastes are discharged into leaching wells, some as much as 50 ft. deep. Even then some of these wells overflow, creating nuisances, so that pumping to a distant discharge point may have to be adopted.

In all of Persia, malaria mosquito control is a major necessity, and the British out of long experience in India and here have evolved efficient practices upon which our Engineers and public health men have improved. The greatest hazards, of course, exist in the southern irrigated date palm region where the weed-lined ditches and the shade from the trees furnish ideal breeding conditions for *anopheles stephensi*. Farther north *anopheles electus* is encountered, while in the far north near the Caspian Sea the principle malaria carrier is *anopheles superpictus*.

The southern region control measures are well worth citing. Since this is irrigated territory, drainage is not possible, thus confining control procedures to ditch cleaning and native hut fumigation. All ditches are trimmed to a 45-deg. slope, and during the two breeding seasons—April to July and Sept. to Nov.—are kept free of floating vegetation and oiled once a week. Areas extending about ¾ mi. beyond camp limits are so treated since this distance exceeds the mosquito's maximum flying radius. In the event that the ditches cannot be cleaned fast enough to provide protection, they are dusted with paris green until the workmen can get to them.

Coolie labor for mosquito control

All of the work is done by coolie labor under the supervision of native labor bosses and Sanitary Corps officers. The coolies, mostly young boys, can't use our equipment, even hand shovels, effectively, so they are paid extra to bring their own tools. These consist of a straight triangular shaped spade equipped with a foot support rather high up on the handle, which they use effectively in trimming ditch slopes; a garden sprinkling can for applying oil; a palm branch for spreading and mixing it; and a date knife (a sawtoothed sickle), used to cut weeds. One of the officers devised a scum scraper consisting of a frame of wire mesh attached to a long handle to remove floating vegetation from the water and this, with a number of crude barges made of corrugated metal into which the cut weeds are loaded, completes the equipment list. About 500 coolies so equipped make short work of the mosquito breeding places.

The other part of mosquito control involves killing the adult mosquitoes, which tend to collect in the native huts out of the sun. For this purpose the officer in charge has organized squads of 10- and 12-yr.-old boys, armed with Flit guns filled with pyrethrum spray. By requiring the boys to march in military formation, he has made a game out of the job, which the boys play with enthusiasm. Accompanied by an armed soldier to suggest authority, the gangs march down village streets, entering every hut in turn. The populace enters into the spirit of the enterprise, and a good time is had by all except the unfortunate mosquito.

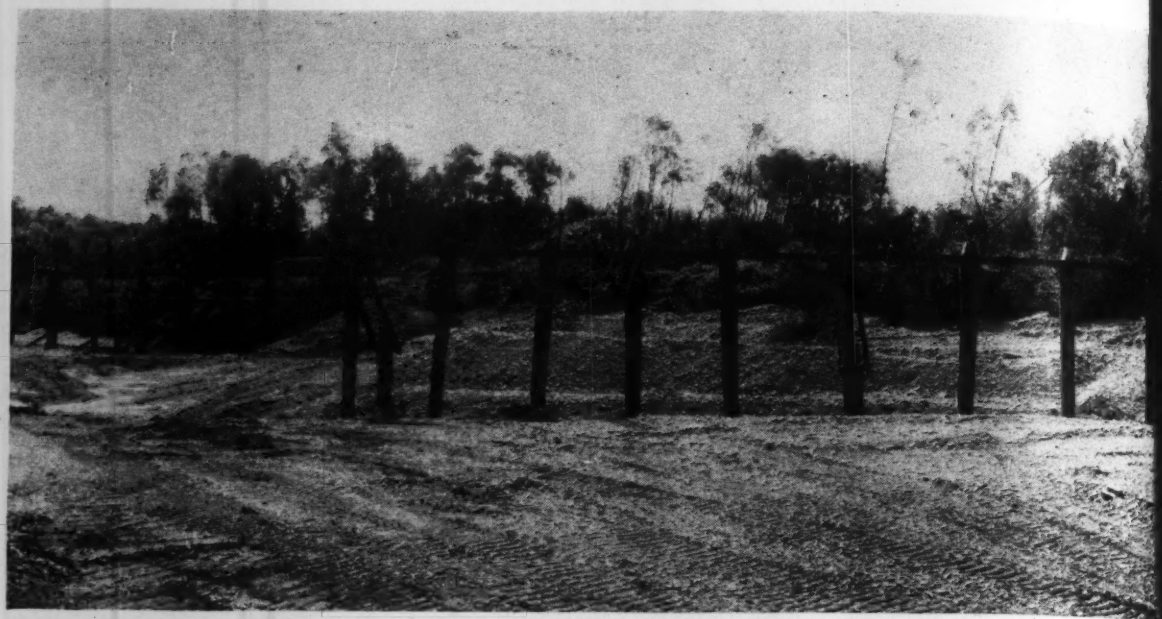


Fig. 1. When covered by leaves and debris, wire fencing nailed to timber piles created an effective dike to end erosion.

Permeable Dikes Built of Wire Fencing

***Contents in Brief**—To halt erosion by the Little Miami River along the municipal airport, Cincinnati built permeable dikes, by nailing heavy wire fence to timber piles on an 8-ft. spacing. Project also included overflow rock-fill training wall built to withstand ice action. A flash flood has proven that both of the low cost structures are effective.*

WITH LIMITED FUNDS AVAILABLE, Cincinnati, Ohio, last year had to find an economical method to halt erosion by the Little Miami River of the levees along the eastern side of the municipal airport. Recent flash floods on the river have shown that the training walls and short dikes built at little cost are very effective.

Relative location of the stream, levee, and protective structures are shown by Fig. 2. Excavation of a new river channel was the first step in the general plan to enlarge the airfield by construction of a short length of new levee and the addition of 3,000,000 cu. yd. of fill behind this embankment. The new channel was cut small to reduce cost, but it is rapidly being enlarged to sufficient size by the swift currents. However, at the upstream end of the cut-off, erosion was destroying the levee protecting the airport. A careful study of the problem showed that training walls and dikes located as in Fig. 2 would not only end erosion of the levee, but would aid in cutting the new channel and shutting off flows along the old location.

To reduce cost in building the dikes, a permeable structure consisting of woven wire fencing nailed to timber piles was used. The piles were of 15-in. dia. and of 30-ft. average length. They were spaced on 8-ft. centers, and at the outer end of the dike and at every fifth pile from the end a second pile was driven 8 ft. back from the fence. This pile, which was much shorter, was to permit addition of a knee-brace for the dike. The bracing between the two posts consisted of two 6x8-in. diagonal timbers and two similar struts, as shown by the photograph above.

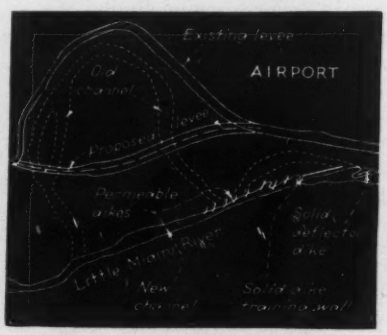


Fig. 2. To enlarge the Cincinnati airport, the channel of the Little Miami River was changed. To control the stream in its new location, a rock-fill training wall, a solid deflection dike, and several permeable dikes were required.

Wire stretched tight

Between the posts at the top a 6x8-in. continuous wale was added, the timber being held in place by a single ¾-in. bolt at each post. Below the wale, fencing consisting of No. 9 gage galvanized hog wire mesh with 5-in. openings was nailed to the piles. The wire ended about 6 in. above river bed and was stretched tight, much as for a farm fence.

In all, eight permeable dikes of this type and varying in length from 40 to 104 ft. were built. The piles were driven with a 5,000-lb., double-acting steam hammer handled by a crawler crane working on the bank. The dikes

ere spaced about 125 ft. apart and ere sloped downstream such that the ngle between the river bank and the ike was about 30 deg.

The dikes were built in a little over month and the cost per lineal foot f dike was $5. When tested by flash oods early in the year, the dikes roved very effective and were unamaged by the swift currents. Leaves nd debris carried by the stream were aught by the fencing and in a short me an excellent barrier was proided.

Training walls to withstand ice

The solid dike training wall at the ead of the new channel is sufficiently ow that it is overtopped during igh river stages. Thus, the wall had o be so constructed as to withstand loating ice and prevent ice jams. The lesign chosen is shown by Fig. 3.

The wall consists of a rock fill between two continuous walls of 2x10-in. sheathing supported by 6x8-in. wales bolted to 20-ft. long, 15-in. dia. timber piles on 6-ft. centers. To eliminate damage from ice flows, two rows of shorter piles were driven upstream on the same spacing and joined to those downstream by heavy oak planks on a slope that would deflect the ice flows upward and over the wall. The space between the sloping timbers was filled with heavy stone grouted in place. In addition, heavy riprap was added to protect the upstream toe of the training wall.

Ice flows were common during the early spring but caused little damage to the training wall. Practically no damage to the timber members occurred and but little of the stone was displaced. The cost per lineal foot was $45.

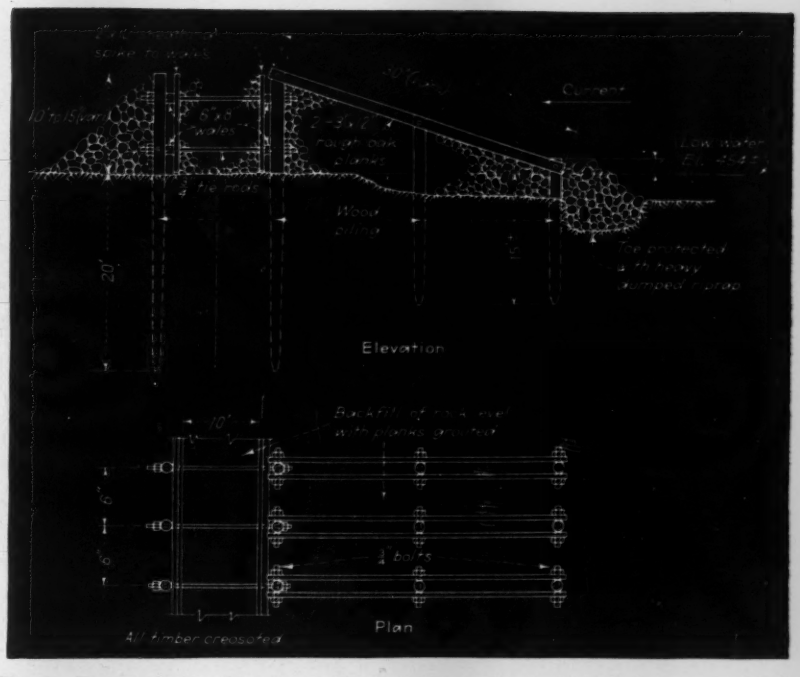


Fig. 3. To permit ice flows over the training wall, sloping planks were added upstream and space between filled with stone grouted in place.

Deflector dike of large stones

The solid deflector dike was built of large stones placed in cement grout. It has a top width of 8 ft. and the sides are sloped 1 to 1. Behind the dike, which cost somewhat less per foot than the training wall, a gravel backfill was added in a few days.

H. H. Kranz is city engineer at Cincinnati, and Bernard H. Kock, assistant engineer, prepared the detailed plans for the dikes and wall. Charles E. Brokaw, superintendent of maintenance, was in general charge.

All the construction work was done by city maintenance forces with Wilburn E. Meyer general superintendent in charge, and Harry R. Balsly, construction supervisor.

War Sanitation Problems in Massachusetts

Massachusetts, like other industrial states, has experienced important environmental sanitation problems because of personnel shortages and the difficulty of obtaining material for remedial sanitary works, according to Arthur D. Weston, state sanitary engineer, who reported his experiences before the recent conference of the American Public Health Association in New York. These problems, he continued, are aggravated by large increases in water consumption and difficulties in guarding or otherwise protecting public supplies in military, civilian and important industrial areas.

Problems in sewage and industrial waste disposal have magnified because of the overloading of existing plants and conditions arising from the use of chemicals not previously experienced in the disposal of sewage and industrial waste in the state, stated Mr. Weston. During periods of low runoff in streams, serious nuisances have occurred where the oxygen in streams has been depleted, resulting in some cases in odors indicating the presence of hydrogen sulphide gas.

Interstate shipment of garbage in Massachusetts has resulted in federal action, while the mosquito control work has been extended from the pest status to consideration of malaria spread.

Housing problems have been sufficiently acute to warrant legislative investigation and consideration of the establishment of limited-dividend corporations to make private funds for housing developments more easily available.

Mr. Weston predicted that these problems will increase and that the personnel of local health departments must receive training to enable them to assume new activities. This is particularly important, he said, because of the possibility of a large amount of reconstruction work which will inevitably follow the termination of the war and the return to normal of American industry.

Fig. 1. Igloos for the storage of gun ammunition were built in groups of three on railroad sidings at a naval depot.

Simplified Design for Munitions Igloos

Contents in Brief—Competition to provide more economical designs for munitions storage facilities has resulted in simplification of design and reduction of metal in both the semi-cylindrical "standard igloo" and the beehive type of magazine. The heavy-bar pattern of reinforcing in the standard igloo has been changed to one layer of mesh, and the bar-truss skeleton of the beehive has been eliminated. Recently both types of magazines, in groups of three, were built for gun ammunition storage at a naval depot, affording an opportunity for comparison of design and methods of construction. Use of a paver, with 58-ft. long inclined boom, for placing concrete directly in the beehive dome through a single, swiveling distribution hopper is one of several construction innovations.

DESIGNS for the standard semi-cylindrical underground storage magazine, familiarly known as the "igloo," and for the beehive type, have been modified considerably in recent months in an effort to provide the most economical structure and to reduce the amount of critical materials, as well as hauling and material handling, required for these structures. Recently a large number of each type of storage unit was built at a naval ammunition depot. Both types were constructed in groups of three for gun ammunition storage, each group of three having a common loading platform at car-door height on a standard-gage railroad siding. In addition, the semi-cylindrical types were built in single units for storage of high explosives, separated by greater distances and served only by roads. Construction of the single and triple units of the semi-cylindrical magazines was similar, however, and only the triple units will be described.

The "Standard Underground Storage Magazine" as built at this depot is 80 ft. long, 26½ ft. wide and has a clear height of 12 ft. The "Corbetta Beehive Type Underground Storage Magazine," which was introduced about a year and a half ago, is 52 ft. in diameter and 16½ ft. high. The beehive was designed to have a 2,123 sq.ft. floor area as compared to 2,120 sq.ft. in the standard magazine. To provide this floor area, the volume of the beehive is about 10 percent greater than that of the standard design.

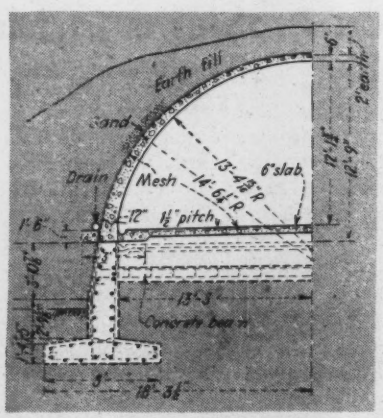


Fig. 2. Solid lines show simplified design of gun ammunition storage igloos, dotted lines indicate original design. Single igloos for storage of high explosives have floor slab separate from wall support.

Steel saved by redesigning

Reinforcing of the semi-cylindrical magazine has been cut to one-third, largely by changing from a double-bar pattern to mesh and by simplification of the foundation. Walls extending several feet into the earth and terminating in heavy spread footings have been eliminated in favor of a slab at ground level that has the edge at the wall supports thickened a few inches. Thrust of the arch, formerly resisted by concrete beams between the two lines of walls, is now taken by the mesh reinforcing of the slab. Field welding, considered necessary for electrical grounding of all reinforcing as protection against build-up of an electrical charge, has been reduced to a few connections for the large mats of mesh.

The arch barrel has not been changed, other than to substitute one line of mesh for the rather large amount of bar reinforcing. Keeping the same section for the concrete as in the earlier design has made it possible to continue to use the many sets of steel forms made up for the standard magazines when the storage program first got into large volume in 1940 and 1941. The front wall of the magazine, to retain the fill, has been

designed as an unreinforced grav- section but the change has been tailed so that the existing forms uld be modified for continued use. When built in groups of three, the mi-cylindrical magazines are paral- and 42 ft. c to c., making them out 13 ft. apart at the spring-line. ch is built as a separate structure cept that the walls along the front e in contact. This joint is keyed.

Construction of standard igloos

First operations in construction of e standard magazines were build- g the subsurface support for the ront retaining wall and the vertical all at the edge of the car-loading latform. A trench was dug by drag- ne along the location of the two alls and concrete was placed for the ooting, followed by erection of orms for both sides of each wall.

Excavation for the deepened edges f the slab to support the arch and nal grading under the entire floor- lab was done by hand. Forms were et for the outside of the wall and ere "hung" for the starting section f the arch barrel. This hanging form as built integrally with the outside orm and was partially supported by mbers to the subgrade, the latter eing removed and the holes filled fter the concrete inside the hanging orm had been placed.

Three pavers were used for con- reting the floor-slab, being located round the area for the triple igloos nd moved as required to permit umping directly from the paver ucket to all parts of the floor-slab. Mesh reinforcing was supported on ar-"chairs" prior to start of con- reting and the full thickness of the lab was placed at one time.

Steel rib and panel forms for the rch barrel were supplied by the Navy rom other jobs. In general, the ribs ere in first-class condition but the hin metal panels had been battered omewhat, leaving irregular form arks on the concrete but not other- ise affecting it. Ribs were 5-in. wide

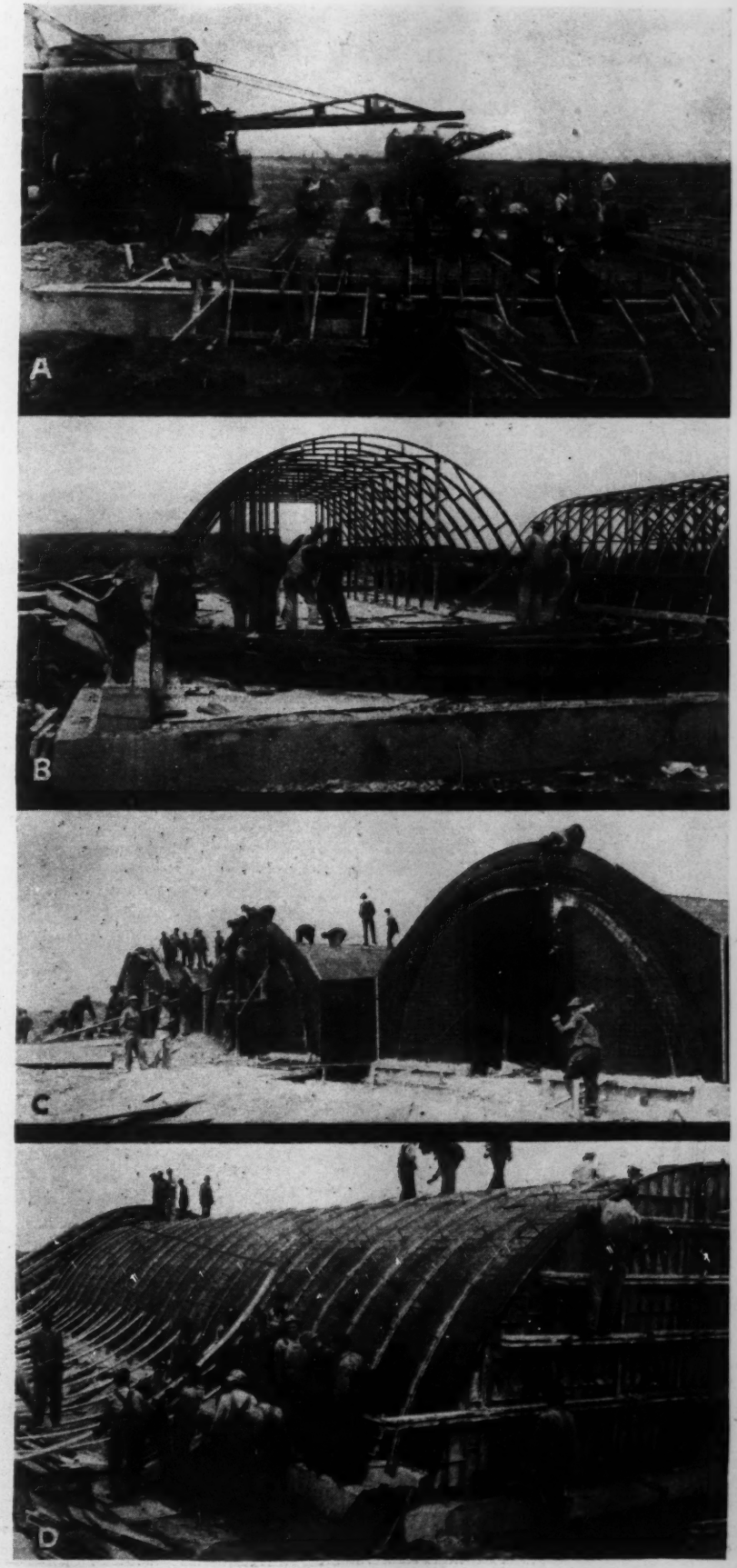
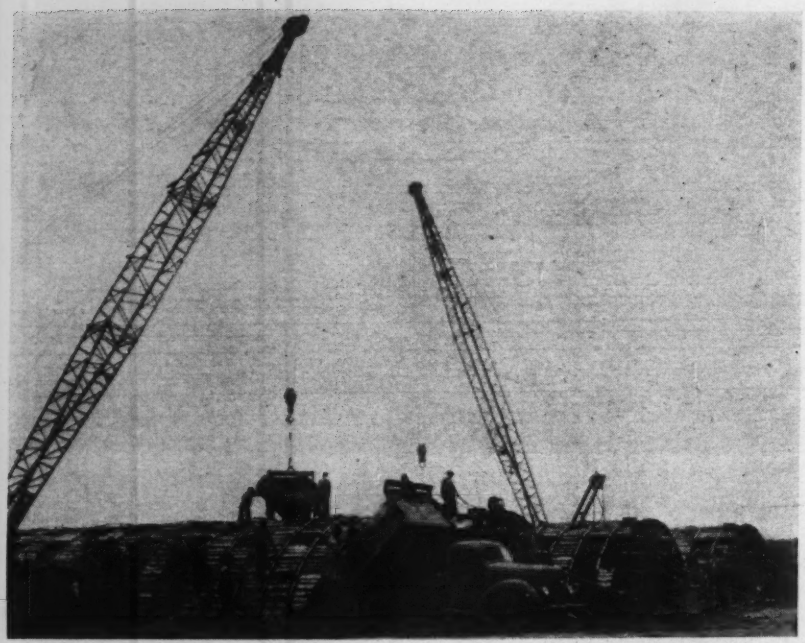


Fig. 3. Sequence of operations of build- g standard igloos. (A) Forms are in lace for base and section of barrel to pring-line with concrete placing being lone by two pavers. (B) Ribs are raised y hand for arch barrel. (C) Mesh on ace wall is welded to insure electric rounding as exterior form is assembled anually in background. (D) Rib for djoining magazine is pulled up as orkmen complete exterior form.



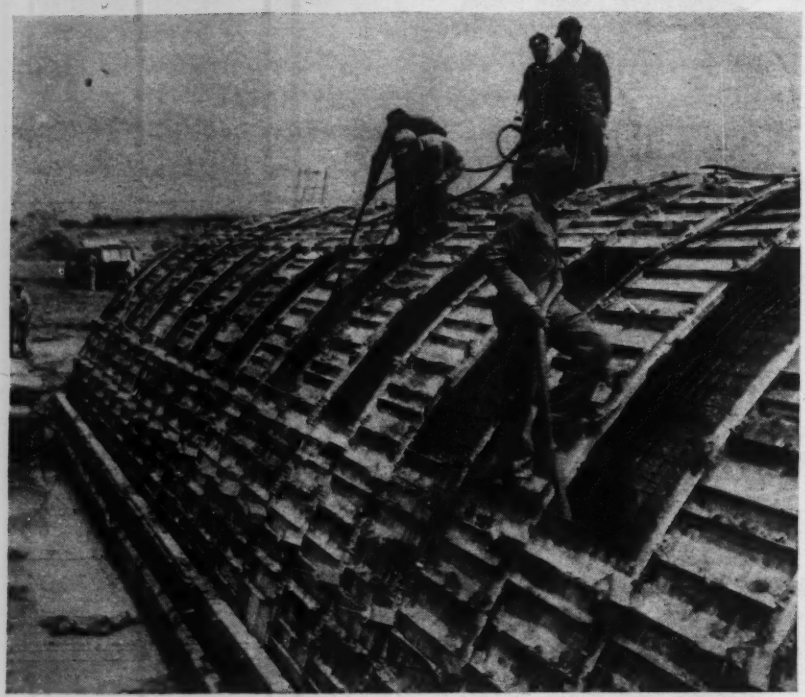


Fig. 4. Concrete was mixed at a "central-plant" of pavers and delivered by dump truck to lay-down type concrete buckets for placing by crawler cranes. Below is close up of form with panels left out for concrete placing.

pressed steel, 24 being used for an 80-ft. long igloo. The ribs were constructed in three sections for the half circle, being bolted together on the ground with 4x4-in. shores inserted at each of the two splice points to support the ring and then raised in one piece by hand. Panels used were 2x3 ft. and were connected to the rings with quick acting fasteners. These forms were planned for early removal of the inserted panel, leaving the ribs to support the arch for the required curing period.

Exterior forms were also ribs and panels, connection to the interior form being combined ties and spacers, all located in the rib sections. Panels in the exterior form extend up the slope only to a point where the concrete would stand without cover. Occasional panels were left out of the form temporarily to permit placing concrete through the openings.

"Central-plant" from pavers

Four or more pavers were set up in a group at a convenient point in an area of standard igloos. These units were used as a central-plant for mixing the concrete required for all operations except the igloo floor-slab. Mixers, raised on movable timber cribs so that they could discharge directly into trucks, were fed by dump trucks hauling two 30-cu. ft. batches. Water was hauled to the mixers, eliminating necessity for pipelines around the area. The mixed concrete was hauled in two-batch loads and was placed in the igloos by lay-down type buckets handled by cranes.

Two buckets were used by each of two cranes placing concrete at a group of three standard igloos. An empty bucket was laid on the ground, the crane hook shifted to a full one, a truck backed up to the empty bucket and the truck body was then raised to force the concrete through a gate in the tail-board. Meanwhile, the crane placed the concrete from the filled bucket dumping it through openings where panels had been removed temporarily from the side forms. As the concrete reached the openings, the panels were replaced and the concrete was dumped into the section above the forms and later spread over the top.

The usual procedure was to use two cranes to place the concrete for a group of three igloos. The two outside igloos were first built, one crane working at each structure, then both cranes placed the concrete for the center igloo. Flexible shaft vibrators were used to consolidate the concrete. A sprayed-on colorless emulsion was applied as a curing agent. Exterior panels and ribs were stripped as soon as the concrete hardened; interior panels were stripped the second day following placing and ribs were removed after seven days.

Beehive-dome magazines

The beehive magazine was developed by Corbetta Construction Co. following the suggestion of Col. B. F. Vandervort, Corps of Engineers, U. S. Army, that a simplified alternate structure for storage of explosives be

tudied. It was designed to require ess reinforcing-steel, copper ground- ng wire, concrete and man-hours of ime.

The structure was first proposed to Army authorities in December, 1941, nd a sample magazine was completed y mid-January of 1942. First Army ontracts for construction of quanti- ies of this type magazine were warded in May of 1942 and this was he first Navy contract. More than ,000 of these magazines have been uilt, the structure has been rede- igned to reduce metal requirements, nd construction procedures have been perfected.

The beehive dome is essentially a pheroid but is built as a polygon or multiple straight-chord figure to sim- plify form construction. It has been built 44-ft. 7-in. dia. to be equivalent in floor area to a 60-ft. standard igloo, and of 52-ft. dia. to provide a floor area almost identical with the 80-ft. long igloo. The spheroid dome is 6-in. thick concrete and rises to a height of 16 ft. 2 in. above the base in the 52-ft. dia. magazine.

Shape of the structure is such that reinforcing steel requirements can be kept to a minimum. An experimental beehive without reinforcing was built and is in use at an Army depot, but a design using some tension steel is now being used.

Reinforcing in the lower 12 ft. of the dome consists of circles of $\frac{1}{4}$-in. dia. cold-drawn wires at $3\frac{1}{2}$ to $5\frac{1}{2}$ in. c. to c., above which no reinforcing is used as the concrete is in compression. The wires are spaced and held $\frac{3}{4}$-in. from the outside surface by continuous "high-chairs" of cold drawn wire, which have hooks to correctly space the tension wires.

Such a high-chair is located at each break of the polygon and at the middle of each chord, eight of the high-chairs continuing to the top of the magazine to complete the electric grounding system.

This reinforcing is a radical departure from the original design (*ENR*, March 26, 1942, p. 498). Similar cold drawn wires, $\frac{3}{8}$-in. dia. were used in that design for the lower 12 ft., with $\frac{1}{4}$-in. dia. wires at 12 in. c. to c. above that point. Spacing was obtained over a bar-truss skeleton.

The bar-truss frame was used to position and support the horizontal wire reinforcement and permitted placing and welding of the reinforcing prior to the erection of the inside forms. When the use of steel became critical the bar-trusses were eliminated, saving over 600 tons on this project alone. A few added sets of interior forms (wood) were required to maintain the speed of construction that had been obtained with the earlier design as reinforcing could not be set ahead of form erection.

The dome is entirely separate from the floor slab with no mechanical attachment such as reinforcing bars or keys. No attachment is necessary for structural reasons as circumferential stresses are resisted by hoop tension in the wire reinforcement. From an operating viewpoint this is considered desirable as it permits the dome to lift easily in case of explosion. The destructive force is believed to be less than for a confined explosion, breaking the concrete.

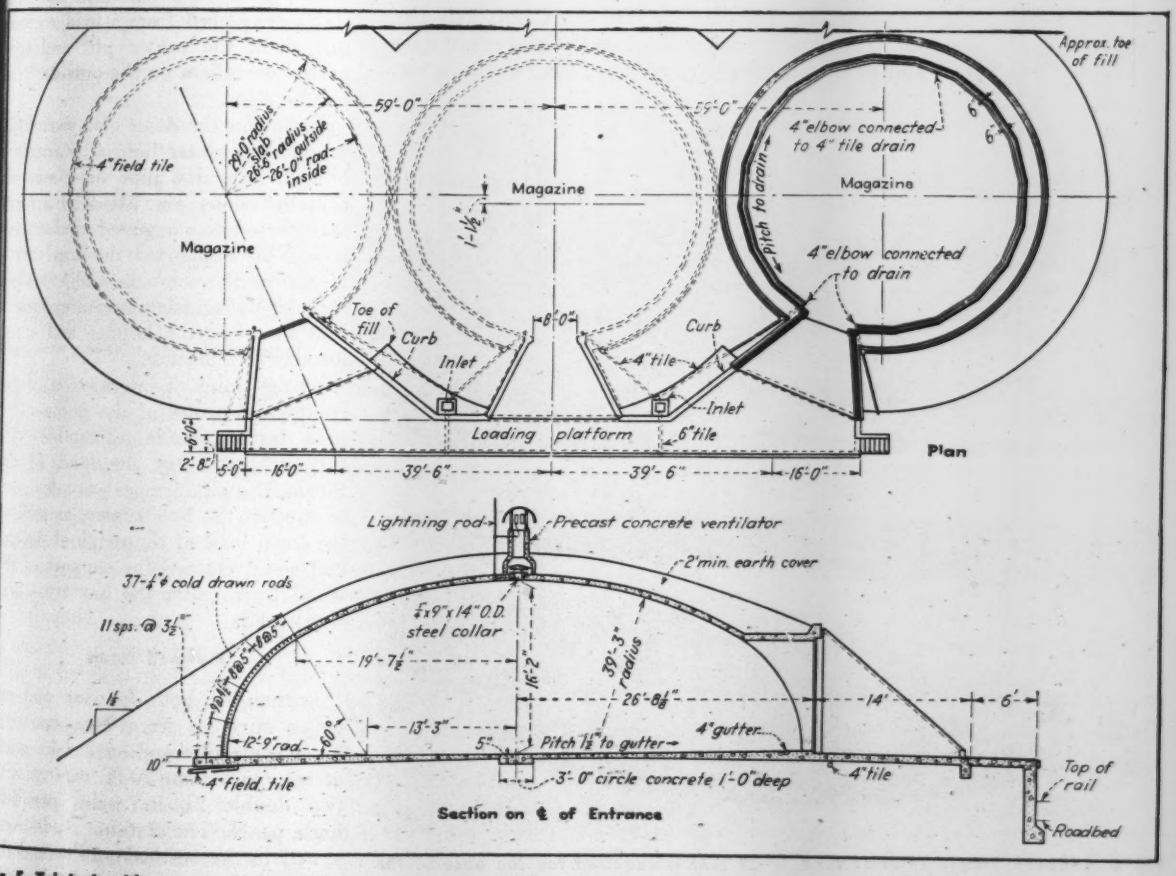


Fig. 5. Triple beehive magazines are turned to meet railroad car-door spacing for easy loading. Base slab lies on ground surface; dome is not attached to slab thus simplifying construction.

The triple-beehives are each identical with those built individually except that changes are made in the entrance tunnel wing-walls. Two of the three beehives in a group are turned so that an axis through the beehive door gives 39½ ft. space between car-doors at the platform line. This shortens the loading platform and accommodates transfer between storage and three railroad cars without uncoupling the cars.

Plan of access for operation of the shell storage area of the depot is to use railroad cars exclusively, hence no means for truck hauling to the magazines were provided. The contractor on beehive construction completed the railroad grading first and used this roadbed, with a 16 to 18 ft. top width, for a hauling road. Turnouts at each group of magazines provided width for passing. Early grading of the railroad line gave the fills time to settle before track laying, and the right-of-way ditches provided drainage. The latter was especially desirable as the soil is a type that holds water and becomes bottomless with frequent rain. The only added expense for hauling roads was surfacing material, which served as an excellent base for ballast and ties.

Excavation for the railroads and the construction area around a group of beehives was done by draglines as the soil was not suitable for use of carrying scrapers. General excavation always included a trench for conducting surface water to a ditch along the right-of-way. A motor-patrol bladed the area to almost exact grade for the beehive floor slab, no hand excavation being required. Over this subgrade, a drainage bed of 2½ in. of crushed stone was placed.

Beehives built from a center hub

A hub, 3-ft. dia. and 1-ft. thick made of concrete, formed a center around which beehive construction was done. From this the structure was laid out; and on it was supported a pipe mast that centered the forms and carried the concrete placing equipment.

The hub was placed first, in a hole dug in the firm earth, forms being used for only the top 5-in. Included was a key around the top to assure bond with the floor slab. Little instrument and layout work was required. It consisted of center and grade for the hub, an axis line through the doorway and grade stakes for the bottom of the form at several points around the base periphery.

The concrete hub was placed a day or two in advance of other concreting operations with bolt-inserts to center a 1-in. dia. pin on the hub. This pin was used as a center to lay out the base slab forms and later served as the center for the dome construction.

Concrete for the slabs was placed by a 1-cu. yd. paver, run over mats of worn plywood laid on the prepared subgrade to a position such that the sweep of the paver boom would cover the 58-ft. dia. base. The slab has a 1½ in. pitch from the center for drainage. Its thickness increases uniformly from 5 in. at the center to 10 in. at the outer edge. It was poured to within 2 in. of the finished floor then welded wire mats placed and the pour continued to grade. This insured the correct location of the mat and eliminated the use of bar-chairs for support.

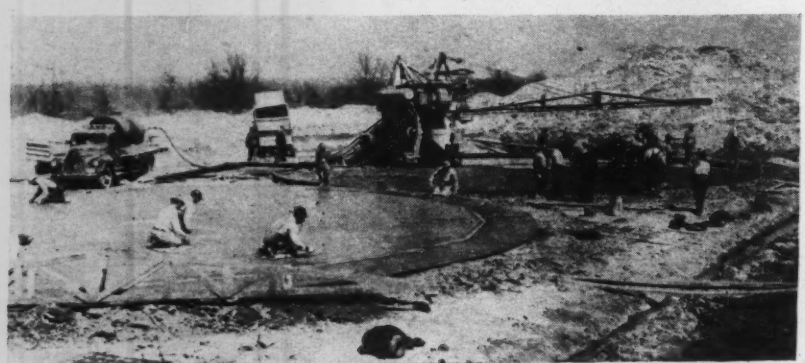
The sheets of mesh were connected by patented clips to provide a ground for possible static electricity. Anchor bolts to hold a pipe frame for support of the interior forms and wood inserts to form a gutter in the base slab were placed from a bridge rotating about the center pin and supported on rollers on the outside form for the slab.

Forms for the dome also were built around the center hub. A triangular-braced, 5-in. dia. pipe mast was set over the center pin, lifted by a four-man crew using a guyed timber gin-pole. This supported the top center forms for the concrete and extended through the ventilator opening in the roof to support a hopper and spout for concrete placing.

At the point of intersection of the compound curves of the dome other pipe frames, made adjustable with turnbuckles, carry the load of the forms. The pipe frames were designed to support the bar trusses, as well as the form load of the original design, and were retained for support of the wood forms after the bar truss was eliminated.

Plywood forms

Forms for both interior and exterior surfaces were ⅝-in. concrete-form-grade plywood on 2x6-in. studs at not more than 20-in. centers with two double 2x4-in. wales per 4-ft. high panel. The 2x6-in. studs were sawed to the vertical radius and the plywood bent over them. At the ends of the forms, sharpness of corners



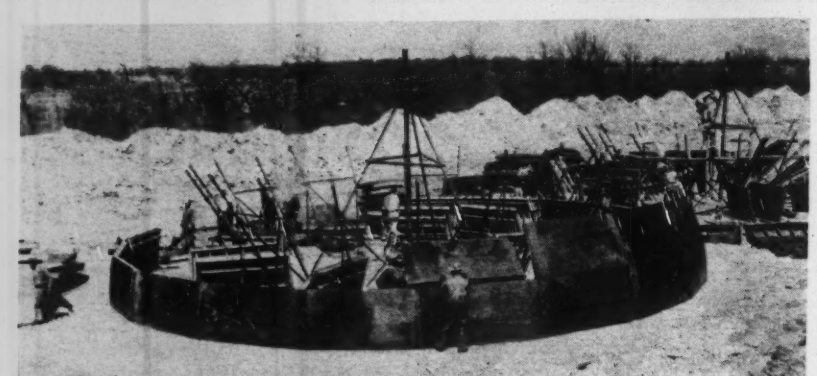
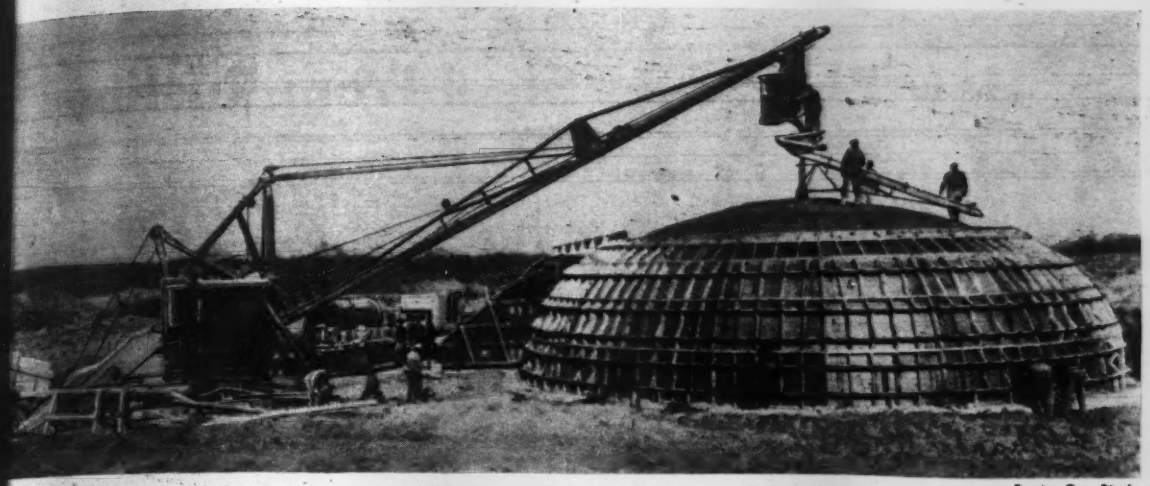


Fig. 6. (Above) Simple exterior form is all that is required for the base of the beehive magazine. (Below) Forms for the dome are plywood bent to curved shape over wood ribs. The center mast helps support the form.



Foote Co. Photo

Fig. 7. Concrete mixing and placing was done by one machine, a 34-E paver with 58-ft. long incline boom.

eliminated by use of a 14-in.- strip "feathered-out" to the ius.

Diagonal braces, from 2x4-in. kers" bolted to the concrete base radial lines, supported the second third row of panels; the pipe mes supported the fourth and fifth of panels and the top section was ried on a collar around the main ter pipe.

Exterior forms were similar to the rior ones except that only four tical rows of panels were used, upper section of the dome being ared without cover. Form ties used re smooth round rods, precast con- te spreaders being used to sepa- the form to the correct dimen- n. After the concrete hardened the s were pulled and the holes filled.

ng-boom paver eliminates cranes

Concrete placing in some of the hive domes was done without a ne or other heavy equipment by enious use of a specially designed g-boom paver and a hopper and vel chute set on the center mast. A E single drum paver with a 58-ft. g boom and special bucket for use a steep incline, placed the concrete. 58-ft. boom made it possible to ce concrete in the entire 52-ft. dia. hive at heights up to 22 ft. Un- tunately, only one paver with this g boom could be obtained, hence ne concrete placing was done by a k crane swinging buckets from a ventional paver to the hopper.

Exterior forms were stripped as n as the concrete hardened. In- ior supports were removed when concrete reached a compressive strength of 1,600 psi. To speed curing and secure quickly the required strength for stripping, water for mixing was heated and four radiant gas-heaters were placed in each beehive. The latter were fired with propane gas. Heating of the domes was done under a subcontract of $5 per single unit, which included furnishing, moving and connecting the heaters and supplying the fuel. Stripping inside forms generally was permissible in three days. Proper curing of the concrete was facilitated by a colorless emulsion sprayed on the exterior of the concrete.

Ditcher saves forming

Construction of the wall along the loading platform was done in an especially ingenious manner. A 48-in. wide ditcher was used to cut a trench with the side near the magazines along the exact line of the vertical wall. Forms were then set for only the face of the wall to be permanently exposed, concrete being placed against the earth on the inside to save labor and avoid disturbing the original soil. The platform slab was placed integrally with the wall.

A 2-ply built-up roofing was placed over the dome structure, and the wing-walls at the opening were given a coat of asphalt paint on the side to be in contact with the fill. Beehives were backfilled by a bulldozer pushing the previously excavated earth to and over the structures. Occasionally, draglines supplement the bulldozers but the latter were preferred as they packed the ground. The three beehives in a group were covered as a unit.

The Naval ammunition storage described was built under a cost-plus-fixed-fee contract by Brown-Bellows, Inc., a combination of Brown & Root, Inc. and W. S. Bellows Co. both of Houston, Texas. S. E. McCullough was project manager and L. M. Bush, general superintendent. The standard igloos were built by this organization under immediate supervision of W. L. Trotti and K. E. McDougal.

The beehive domes were built by Corbetta Construction Co. of New York under a fixed-price contract. Louis P. Corbetta had general supervision of the work for his firm. H. W. Murray was project manager; Hans Jacobsen and Frank LaMorte served successively as superintendents on construction.

Kewitt, Condon & Cunningham, with Ray Terry in charge, did the earthwork and backfilling on the beehives under a sub-contract from Corbetta Construction Co. Laying of ties, track and ballast for all the storage magazines was done by the general contractor under a separate sub-contract with Wm. A. Smith Construction Co.

Architect-Engineers for the project were Shaw, Naess & Murphy; Charles Deleuw & Co., and George M. Brown. T. C. Fredericks was project manager for this group.

Capt. H. S. Bear (CEC), USN, was officer in charge of construction of the depot for the Navy's Bureau of Yards and Docks. Lieut. Comdr. W. A. Rukeyser (CEC), USNR, was executive officer during most of the magazine construction.

For security reasons the location and extent of the project have been omitted.

How Zinc Saves Steel From Rusting

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Technical Department, The New Jersey Zinc Co. (of Pa.)
Palmerton, Pa.

● **Metal protective paints containing zinc pigments function not only by acting as a mechanical barrier to corrosive atmospheres, but also by inhibiting rust at breaks in the paint film. Modern paints contain a mixture of pigments, varying according to the service requirements. An 80-20 zinc dust-zinc oxide mixture has excellent protective qualities, is non-toxic and will adhere to galvanized surfaces. A 50-20-30 zinc dust-zinc oxide-iron oxide combination makes a good red maintenance paint that resists industrial exposures. Adding 15 to 20 percent zinc oxide to an iron oxide paint improves its protective qualities. Zinc chromate paints are particularly resistant to seawater but require a synthetic resin vehicle. A new zinc tetroxy chromate has been developed that can be used with linseed oil to provide a good general maintenance primer.**

ZINC HAS LONG SERVED TO PROTECT iron and steel structures from rusting —not only as metallic coatings, such as galvanizing, but also as pigments in metal protective paints. Recently, there have been major developments in these paints, developments in which zinc pigments have earned an increasingly prominent place. The purpose of this article is to summarize these developments, and to emphasize the most efficient utilization of zinc pigments in the protection of iron and steel. While this discussion of metal protective paints is focused chiefly on primers and shop coats, the principles involved apply to complete systems.

An obvious function of metallic coatings is to provide actual mechanical protection against rust by presenting a continuous surface to act as a barrier against moisture or dilute solutions of corrosive gases, salts, or acids, while a second important function is to afford electrochemical protection at any break in the mechanical barrier. Whether or not we accept the theory that the oxidation or rusting of iron in the atmosphere is always an electrochemical phenomenon, the practical evidence is clear that it can be prevented or retarded under many conditions by the electrochemical effect of a metallic coating sacrificial to the iron.

The corrosion or solution of metal is explained by the Electromotive Series of metals, the metal higher in the series being dissolved while protecting the lower metal. In an abridged list of the electromotive series metals appear in the following order: Magnesium, Aluminum, Zinc, Chromium, Iron, Lead, Nickel, Tin, Copper, Silver. Thus, zinc will sacrificially protect iron, lead, nickel, etc.; iron will sacrifically protect lead, nickel, tin, etc.

The sacrificial action of zinc is described in *Galvanizing and Tinning* (W. T. Flanders, 1922, p. 12):

"This property is of great value, as the zinc coating does not corrode rapidly, even with the galvanic action set up, so that it lasts for a far greater length of time than would naturally be expected. The very fact, however, that the zinc corrodes at the expense of the iron is all that is necessary to protect the iron or steel.

"Other metals like lead or tin, on account of their not being electropositive to iron, do not act like zinc—and if portions of the iron happen to be exposed, even such as a pin hole, the iron begins to corrode. With zinc coating, however, this will take place."

Many of the observations on me coatings are also applicable to z pigment paint coatings because, l metal coatings, metal protecti paints must perform two import functions:

1. Mechanically protect the und lying metal.

2. Inhibit corrosion during a following the breakdown of the m chanical protection, i.e., protect sm uncoated areas such as pinhol scratches, etc.

Mechanically, no paint film is su ciently perfect or permanent to insu complete, continuous protection. may not be generally realized, b minute quantities of moisture or d lute solutions of corrosive agents w eventually penetrate even multip coats of paint, and once this penetr tion is completed, rapid corrosion the metal surface will result unle rust inhibitive (chemically active pigments are incorporated. Anoth significant fact is that all paint fil undergo chemical changes, known ageing, during service. This is an u avoidable characteristic of the bind portion of the film, but in ma paints ageing is accompanied by th formation, within the film, of corr sion products. However, by use proper corrosion inhibitive pigment this effect can be automatically co trolled.

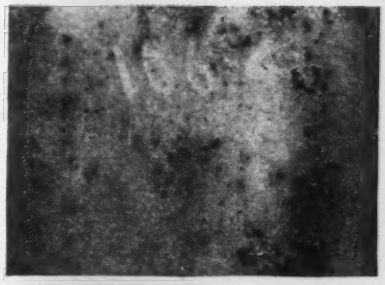
Formulating metal protective paint

Originally, metal protective pain were prepared with single pigment such as iron oxide, red lead, and blu lead, but for many years practic has tended toward a combination pigments. Also, the vehicle used t bind the pigments was originally li seed oil, but now, in many cases, oi and resins are combined to improv the mechanical protection properties

Some pigments are definitely mor

fective in supplying mechanical and st resistant properties than others. nc oxide is used to improve the echanical properties of a metal pro- ctive film, and zinc dust and zinc romate are effective in supplying st-resistant properties. Also, zinc rments can be combined with other ments, which supplement them fectively. Paints using mixtures of nc pigments and other pigments are common, economical use, as illus- ted by the many zinc chromate- n oxide and zinc oxide-iron oxide ints on the market and specified by armed forces Frequently, the me pigment combination will be ed with several types of vehicles to ure widely different paint proper- s. For example, the pigment may prove the film toughness and sup- rust inhibition, but one type of hicle may be used to secure fast ying of the paint and another type vehicle to secure great resistance water.

The type of service and the method application must be considered hen formulating a metal protective int because it is not possible to rmulate a universal paint to give timum service under all conditions. so, the experience of the paint anufacturer is required to obtain



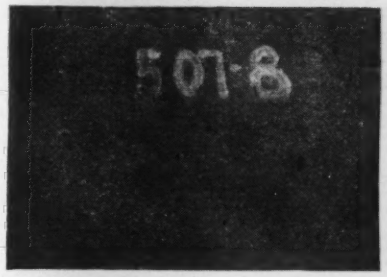


Fig. 1. Comparison of protection afforded by a paint containing no zinc dust (top) with one containing 80 percent zinc dust. Paints were applied on slightly rusted steel, and pictures were taken after three years' vertical south exposure.

the best paint for each type of service. He has recognized the difficulty of securing all the desired properties of a good metal protective paint through the use of a single pigment, and today nearly all paint manufacturers market products prepared with a mixture of pigments. The increasing, widespread use of zinc pigments in these metal protective paints is a result of their general effectiveness. The accompanying table gives a typical list of federal, U. S. Army, U. S. Navy, and U. S. Maritime Commission specifications for zinc pigment primer paints.

The pigment combinations discussed below represent broad classifications of formulas for which considerable experience has been accumulated.

Zinc dust-zinc oxide paints

Metallic zinc powder, commonly known as zinc dust, is distilled in a specially designed furnace as a gray, very finely divided pigment. The pigment is so fine that 70 percent of it has an average particle size of 10 microns (0.00039 in.) or less, and 97 percent will pass through a 325-mesh sieve (0.0017-in. openings). The relatively small proportion of coarse particles present imparts a slight roughness to the paint film, a condition known as "tooth," which is usually desirable where finish coats are to be applied.

Zinc dust contributes several de-

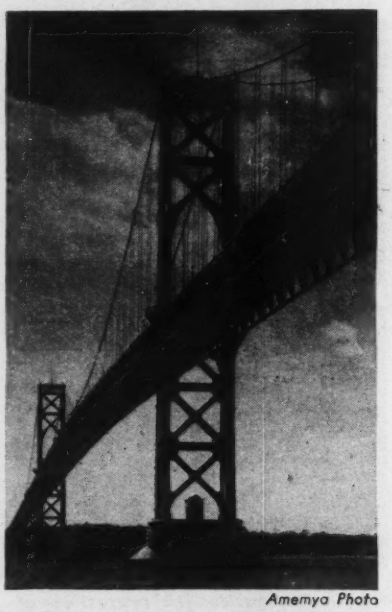
SOME PRIMER AND FINISH PAINT SPECIFICATIONS REQUIRING ZINC PIGMENTS IN THEIR FORMULATON

FEDERAL SPECIFICATIONS	USED FOR	PIGMENTS IN PAINT
1 Spec. TT-P-641, Types I, II and III	Primer for Galvanized (Zinc-Coated) or Zinc Surfaces	Zinc Dust and Zinc Oxide
2. Spec. TT-P-31a, Types A and B	Red Metallic Paint for Metal and Wood	Iron Oxide, Zinc Oxide, and Siliceous Inerts
U S ARMY		
1. Ordnance Department Spec. AXS-750	Quick-Drying Primer, Rust-Inhibiting	Zinc Yellow or Zinc Tetroxy Chromate, Iron Oxide, Zinc Oxide, and Extenders
2. Ordnance Department Spec AXS-946	Primer, Synthetic, Lacquer-Resisting (for Ammunition)	Zinc Yellow or Zinc Tetroxy Chromate, Iron Oxide, Zinc Oxide, and Extenders
3 Ordnance Department Spec. TAC-ES No. 680a, Classes 101 and 147	Metal Primers — Brown	Zinc Yellow or Zinc Tetroxy Chromate, Iron Oxide, Zinc Oxide, and Tinting Material
4. Corps of Engineers Spec T-1600	Primer, Rust-Inhibiting	Zinc Yellow or Zinc Tetroxy Chromate, Iron Oxide Zinc Oxide, Extenders, and Tinting Material
5. Corps of Engineers Spec. T-1602	Primer, Phenolic, Water-Immersible	Iron Oxide, Zinc Yellow, and Magnesium Silicate
6. Corps of Engineers Spec. T-1715A, Type I	Protective Coating Materials and Application (for Interior of Potable Water Tanks)	Zinc Dust and Zinc Oxide
7. Corps of Engineers, Ohio River Division Spec. P-2100		
U.S.E.D. No. 511	Metal Prime Coat	Zinc Dust and Zinc Oxide
U S.E.D. No. 512	Metal Prime Coat	Iron Oxide, Zinc Yellow. Red Lead. Silica
U.S.E.D. No. 513	Metal Prime Coat	Zinc Dust, Zinc Oxide, and Iron Oxide
8 Army Air Force, Army-Navy Aeronautical Spec. AN-TT-P-656a	Primer, Corrosion-Inhibiting	Zinc Yellow and Extender
U. S. NAVY		
1. Bureau of Ships Spec. 52P18	Primer, Corrosion-Inhibiting	Zinc Yellow, Titanium Dioxide, Raw Sienna, and Magnesium Silicate
2. Bureau of Ships Spec 52P26	Primer. Metal (Brown)	Zinc Yellow or Zinc Tetroxy Chromate, Zinc Oxide Red Iron Oxide, Extenders, and Tinting Material
3. Bureau of Aeronautics, Army-Navy Aeronautical Spec AN-TT-P-656a	Primer, Corrosion-Inhibiting	Zinc Yellow and Extender
U S. MARITIME COMMISSION		
1. Spec MC-52-A-1, Item XXIII (A)	Rust-Inhibiting Metal Primer for Deep Tanks.	Iron Oxide, Zinc Yellow, Zinc Oxide, Silica, and Magnesium Silicate
2. Spec. MC-52-B-1, Class I (A)	Ships' Bottom, Anti-Corrosive Paint (Light)	Zinc Oxide, Zinc Yellow, Silica, and Magnesium Silicate
Class I (B)	Ships' Bottom, Anti-Corrosive Paint (Dark)	Zinc Oxide, Lampblack, Iron Oxide, Silica, and Magnesium Silicate

sirable mechanical properties to the metal protective paint film, of which film distensibility, abrasion resistance and adhesion are particularly valuable. The rust inhibitive property of the zinc dust pigment, however, is of greater importance. Consisting mainly of metallic powder, it is higher than iron or steel in the Electromotive Series of metals and, in accordance with the previous discussion on corrosion, exercises sacrificial protection toward the ferrous metals.

The rust inhibitive action is important for paint applications on properly prepared surfaces and, of course, this is the ideal condition for painting. By accident, however, or for reasons of economy, paint may be applied on partially rusted surfaces, and under these conditions the formula possessing the better rust inhibitive properties will give the longer service. Fig. 1 illustrates the simultaneous exposure of two types of metal protective paint, and it will be seen that the paint based on the rust inhibitive zinc dust pigment has given the better metal protection.

Since zinc dust is a heavy metallic powder, its settling tendency should be compensated for in formulating the paint, and zinc oxide is often used for this purpose and to supplement other properties. Zinc oxide is a white powder, very small in particle



Amemya Photo

Fig. 2. Zinc dust-zinc oxide primer is used both on the galvanized and the structural steel of the Mt. Hope Bridge.

size, produced by burning zinc vapor in air. It facilitates the formation of firm, uniformly dried paint coatings, which have high abrasion and water resistance. In other words, it greatly improves the mechanical protection afforded by the metal protective paint. It is generally agreed that zinc oxide also contributes inhibitive action and aids other inhibiting pigments counteracting undesirable acid conditions developed within the paint coating upon weathering.

A pigment mixture of 80 percent zinc dust and 20 percent zinc oxide the one that has found the widest acceptance, a typical service being illustrated in Fig. 2. This zinc dust paint is high in hiding power and light gray in color, properties that are desirable in many cases, and may be readily tinted to meet other darker color requirements.

The paint is also nontoxic, making it particularly valuable for service drinking water tanks. Fig. 3 illustrates the superior service properties of the 80–20 zinc dust-zinc oxide combination with linseed oil as compared with two other representative metal protective paints after eight years' underwater service. Zinc dust paints also have given very successful service on the Ohio River flood control dams, and a series of service tests, instituted with these paints for the protection of ship bottoms in salt water, has provided encouraging preliminary results although further testing is in order.

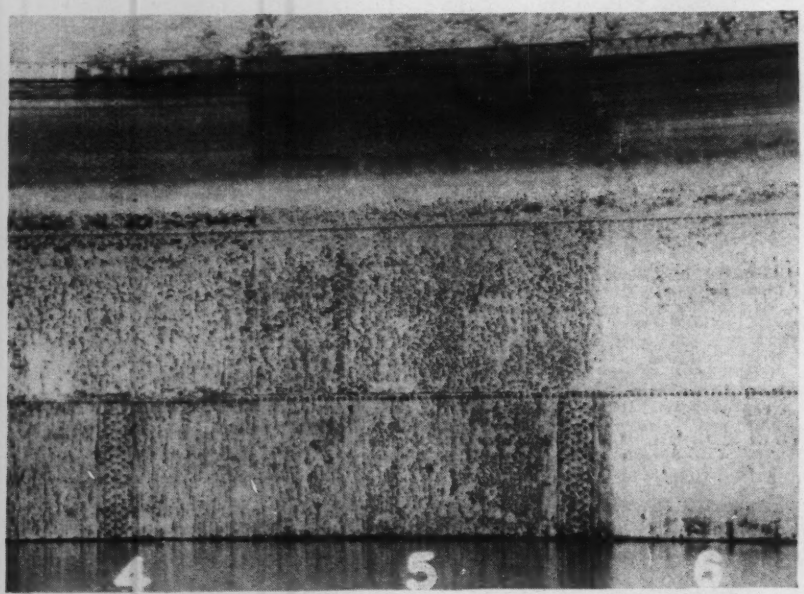


Fig. 3. After eight years' exposure in a water tank, areas covered with various metal protective paints, all with a linseed oil vehicle, showed different degrees of corrosion. For Area 6, the least affected, the pigment was an 80-20 zinc dust-zinc oxide. For Area 5, a 100 percent red lead pigment was used, and for Area 4, an 85-15 iron oxide-zinc oxide.

Paint for galvanized surfaces

To decorate or to maintain appearance, the engineer will frequently be required to paint galvanized iron or other zinc surfaces. The adhesion of the usual metal primer paints to these surfaces is generally problematical and in unusually cold weather such paints often peel badly, indicating that a strong bond between the paint and the metal never developed. Zinc dust paints have particularly good adhesion to galvanized and other zinc surfaces. In addition, as previously indicated, they have good distensibility upon weathering and, consequently, any tendency to pull away from the metal is minimized.

This excellent adhesion of a zinc dust coating is recognized in Federal Specification TT-P-641 for paint primers for galvanized or other zinc surfaces. This specification requires an 80–20 zinc dust-zinc oxide paint and defines three types according to the vehicle used Type I, linseed oil vehicle, is for general maintenance painting. Type II, glyceryl phthalate vehicle, is for quick drying and heat resistance, and Type III, phenolic resin vehicle, is for quick drying and water resistance.

Where some reduction in cost is

desired and a red color is not objectionable, appreciable quantities of natural red iron oxide may be added to the zinc dust-zinc oxide pigment combination. Natural iron oxide pigments, which have been used for years in metal priming paints, retard corrosion essentially by mechanical protection, affording a moderately effective method of sealing the metal surface against moisture.

A 50–20–30 zinc dust-zinc oxide-iron oxide pigment combination in linseed oil is an excellent, high hiding, general maintenance red paint for iron and steel. Another desirable property of this combination is its very satisfactory service in acid atmospheres of industrial locations. However, because reduction in the zinc dust content affects adhesion, the 50–20–30 paint is not considered desirable for galvanized or other zinc surfaces. Synthetic resin vehicles can be used with 50–20–30 pigment mixture where fast drying and/or underwater use are major considerations. In addition to the natural red iron oxide, black, brown, or yellow iron oxides are also effective additions to the zinc dust-zinc oxide combination.

Zinc oxide-iron oxide paints

Straight iron oxide paint seems neither to inhibit nor to stimulate corrosion, and protects essentially by mechanical means. Consequently, the practice has arisen of adding other pigments to an iron oxide paint to build up its inhibitive value and to increase its mechanical protective efficiency. Zinc oxide fulfills these requirements very well, and a pigment combination of 80 to 85 percent iron oxide and 20 to 15 percent zinc oxide is suggested. The resultant improvement in metal protective properties is significant and is evident in both raw linseed oil (Fig. 5) and synthetic resin vehicles. Whether the improvement is due primarily to the greater inhibition, or to film firmness introduced by the zinc oxide, is debatable. In addition, zinc oxide helps suspension during storage of the liquid paint, and minimizes mildewing and color change during weathering of the paint film. Federal Specification TT-P-31a for iron oxide paint recognizes the value of zinc oxide by calling for a minimum of 12 percent of this pigment.

Many other types of paints, for example lead chromate, are similarly improved when zinc oxide is added.

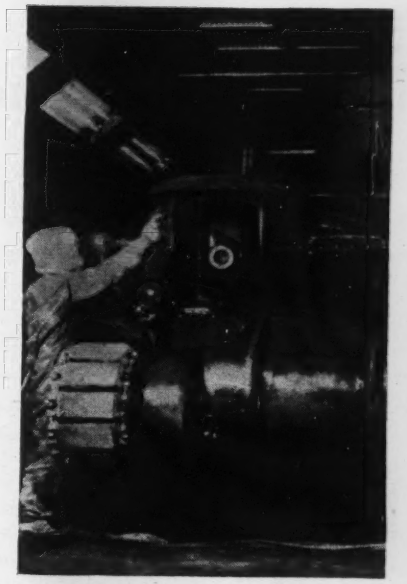


Fig. 4. As fast-drying primers for army tanks, zinc tetroxy chromate-iron oxide-zinc oxide inert pigment mixtures are widely used.

As far back as 1915, the American Society for Testing Materials issued a report based on practical weathering tests, which rated zinc chromate, a widely used colored pigment usually known as zinc yellow, as an excellent pigment for the protection of ferrous surfaces. During the present war, there has been a vast increase in the use of zinc chromate primers, particularly in the shipbuilding field. Although it is outside the scope of this discussion, it should be noted in passing that zinc yellow paints also are widely used for protecting the stainless steel, aluminum and magnesium surfaces of our aircraft.

The extent to which zinc chromate paints are being used for our ships indicates the importance of the pigment. In commenting upon the painting of naval vessels, (*Official Digest*, Federation of Paint and Varnish Production Clubs, May 1943, p. 186) Lieutenant H. L. Aldrich reports:

"Interiors of steel vessels are primed with one coat of Zinc Chromate Primer (52P18), which in most cases is the after-pickling coat, followed by a coat of Fire-Retardant Inside Semi-Gloss White Paint (52-P22) . . . ."

"The exterior portion of steel vessels, which is above the water line, receives two coats of Zinc Chromate Primer followed by two coats of camouflage paint, the last of which is sometimes omitted to expedite delivery.

"The hull section below water line receives two coats of Zinc Chromate Primer followed by a coat of plastic anti-corrosive and a final coat of hot-plastic or cold plastic anti-fouling paint. When the boat is launched in

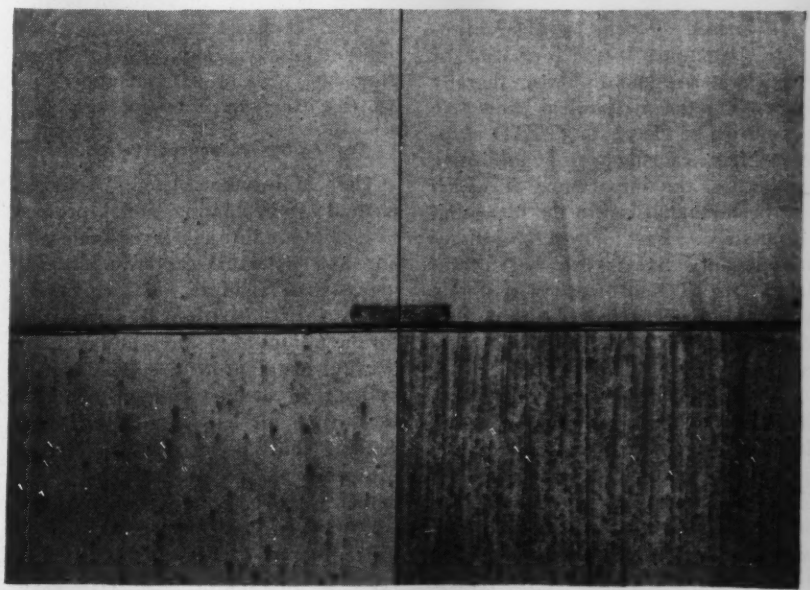


Fig. 5. Improvement in weathering and rust-inhibiting qualities gained by adding zinc oxide to iron oxide paint. Upper two panels painted with 85-15 iron oxide-zinc oxide, in linseed oil, the left panel getting two coats, the right only one. Lower two panels painted with 100 percent iron oxide in linseed oil, the left panel two coats, the right only one. Exposure, 29 months at 45 deg. south.

fresh water, the two coats of Zinc Chromate Primer are generally the only protection, and the anti-corrosive and anti-fouling coats are not applied until a later time when the vessel is placed in drydock."

Zinc yellow is a relatively lightweight pigment, weighing less than iron oxide and only about half as much as red lead. It is effectively used in combination with cheaper pigments such as iron oxides or inerts. It is used almost exclusively in synthetic resin type vehicles, with or without other pigments, making excellent rust inhibitive primers for underwater service.

Zinc tetroxy chromate, known as ZTO chromate, is a zinc chromate pigment ($ZnCrO_4 \cdot 4Zn(OH)_2$) that was discovered after extensive research to develop a product of the chromate type that can be used with ordinary raw linseed oil vehicles to make general maintenance primers. It is essentially free from soluble sulfates and similar corrosion-inciting materials. It is relatively low in tinting strength, having been developed for its corrosion inhibiting properties and not as a color.

The relatively low specific gravity of ZTO chromate results in lightweight paint with little tendency to settle. In addition, the lightweight paints are easy to handle, especially in spray application, since lower air pressures can be used.

In linseed oil vehicles, ZTO chromate contributes to the formation of firm, water-resistant films, thereby improving the mechanical protective properties of the coating. ZTO chromate has excellent rust inhibitive properties, the importance of which has been emphasized in the foregoing discussion. Fast drying, general maintenance paints can be formulated with ZTO chromate in synthetic resin vehicles, but it is desirable that these vehicles be essentially nonreactive.

While higher ratios of ZTO chromate pigment can be used in formulating excellent metal protective paints, a combination of 65 percent ZTO chromate and 35 percent red iron oxide is suggested. As indicated above, this pigment combination may be used either with linseed oil vehicle or with the less reactive synthetic resin vehicles. While natural red iron oxide is most frequently used in combination with ZTO chromate, the black or yellow iron oxides are equally effective. In addition to the 65–35 ZTO chromate-iron oxide combination, many other ratios of these pigments, with or without added inert, give excellent protection (Fig. 4).

U. S. Navy photo

Fig. 6. Two coats of zinc chromate primer, followed by two coats of camouflage paint above the water line are used for our Naval vessels.

Testing metal protective paints

The only completely reliable method of evaluating metal protective paints is through large scale application in actual service on buildings, tanks, bridges, etc. However, because of the length of time required for the failure of the present day, high quality, metal protective paints, it is difficult to evaluate these formulas by normal air exposure in any reasonably short period of time. Panel exposures on the test fence or under actual service conditions are frequently used, and to increase further the speed of film evaluation, many types of laboratory tests have been devised.

The laboratory determination of such properties as distensibility and permeability of the film cannot be used alone to interpret actual service reliably, although metal protective paint films are now considered as possessing measurable physical properties. Laboratory tests of the continuous water immersion type have been receiving increasing recognition. In this test, metal panels, carefully painted with the test formulas, are suspended in fresh water or simulated sea water and are held at a little above room temperature until corrosion and blistering failures appear. The procedure is not standardized and varies from laboratory to laboratory, the results of water immersion tests being greatly influenced by the conditions under which they are run.

Florida tidewater exposures are being used to a considerable extent as an accelerated type of natural exposure. Results are of value for interpreting paint service under similar periodic immersion conditions, but do not apply to general maintenance or continuous immersion conditions. Care must be exercised not to interpret results too broadly. Alternate immersion tests in a laboratory, to simulate tidewater exposure, are also in use, but experience with them appears too limited to permit conclusions as to their practical merit.

So-called accelerated weathering tests are definitely designed as speed-up evaluations of the paint film. Regardless of the type of equipment or the weathering cycle, the tests can be accepted as of value only if the limitations of the procedure are appreciated. Considerable experience in the testing of metal protective paints and paint systems in accelerated weathering cycles, and reasonable knowledge of normal paint service, are required before the results can be interpreted with any degree of confidence.

Panel exposure tests, either on test fences or in areas of actual paint service, represent a more reliable paint evaluation procedure than the accelerated weathering system. Nevertheless, even with the outdoor panel tests, the results are not fully representative of actual practice because of the differences (1) in service characteristics of the steel structure as compared to a test panel and (2) in the procedure for painting large structures as compared to a panel. Only if the panel painting program is extensive and includes a sufficient number of duplicates to cover potential vagaries of panel testing can the results be accepted as a reliable basis for action.

Bridge Bearings Replaced Under Traffic

***Contents in Brief**—The 3-in. expansion rollers for a highway bridge were replaced with three 1-in. thick plates, consisting of two 1-in. steel plates and one self-lubricating bronze plate of equal thickness. To add the plates for the 220-ft. Pratt truss span, one-half the roadway was left open to traffic and the truss for the opposite side of the deck raised by jacks placed on the pier and an A-frame falsework. On the remainder of the bridge, which consists of four lines of 100-ft. Warren trusses, two lines of the trusses were raised simultaneously by screw jacks on timber platforms at the first panel points.*

REPLACEMENT of the "rust frozen" expansion shoes under several spans of a New York City bridge has been accomplished with one-half the roadway open to traffic at all times, despite close restrictions on the area available for falsework and poor ground support for the falsework. The roller nests were replaced with self-lubricating sliding bearings of bronze. At one pier a large broken bearing stone had to be removed and a new stone added.

The structure is the Bronx approach to the Macombs Dam Bridge over the East River, which provides a 40-ft. roadway flanked on either side by a 9-ft. sidewalk. The approach includes a 220-ft. through Pratt truss span over five tracks of the New York Central and eleven 100-ft. Warren deck trusses with a double-web system. It was at one end of the 220-ft. Pratt truss span that a 5-ton bearing stone in the granite pier, which was about 18 ft. high, had to be replaced. Work at this pier was most difficult and it will first be described.

Jacks lift corner of truss

The bearings for the Pratt truss were replaced by lifting one corner of the truss while through traffic was maintained on the opposite side of the bridge. The jacking arrangement shown in Fig. 1 was used. Connection to the truss was made by placing two saddles cut from 26½x24x1¾-in. plates under and around each 8-in. dia. connecting pin. The saddles were of 8-in. minimum width and to each leg of both saddles was pinned an 8x⅞-in. plate 12 ft. long. These plates extended upward to two heavy beams

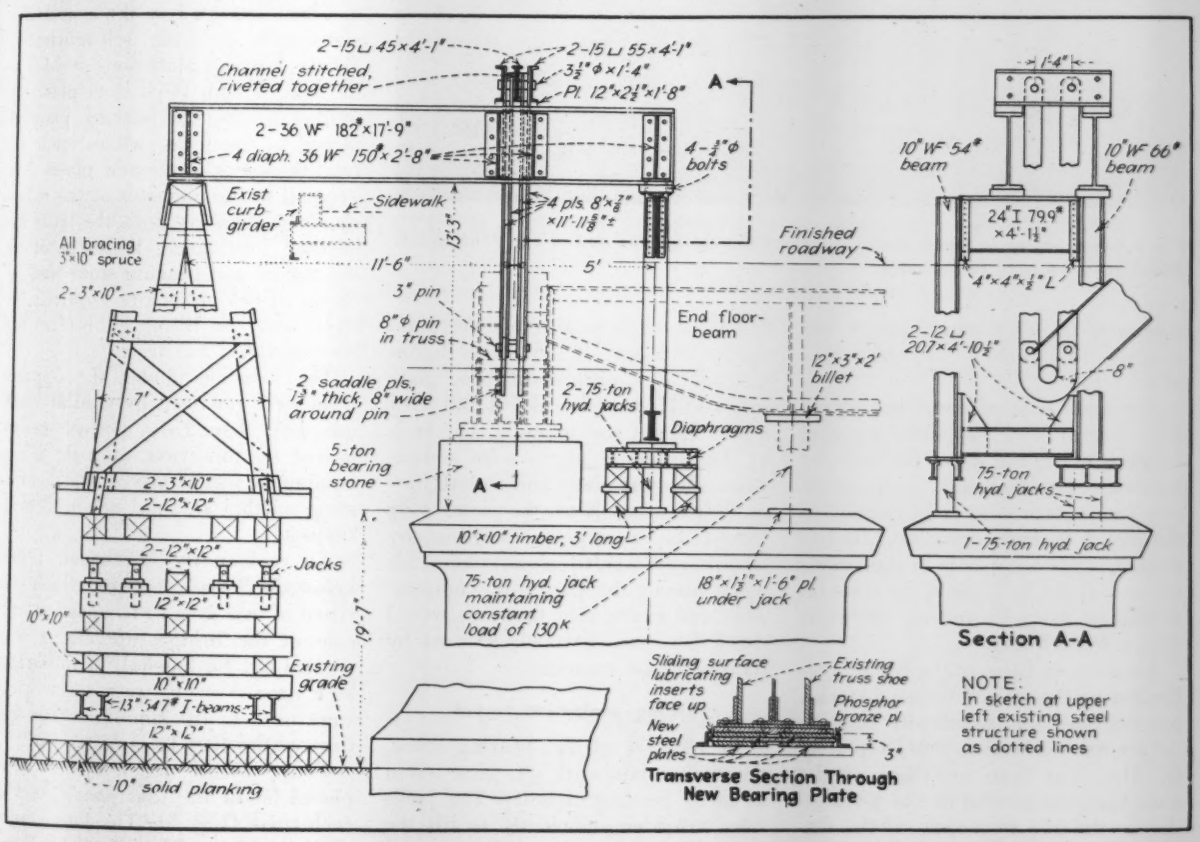


Fig. 1. Ends of the Pratt trusses were lifted by two sets of jacks, one placed on the pier and the second on an A-frame falsework. It is to be noted that a constant lead had to be applied under the floorbeam to raise it simultaneously with the truss, otherwise the floorbeam connection would have been overstressed.

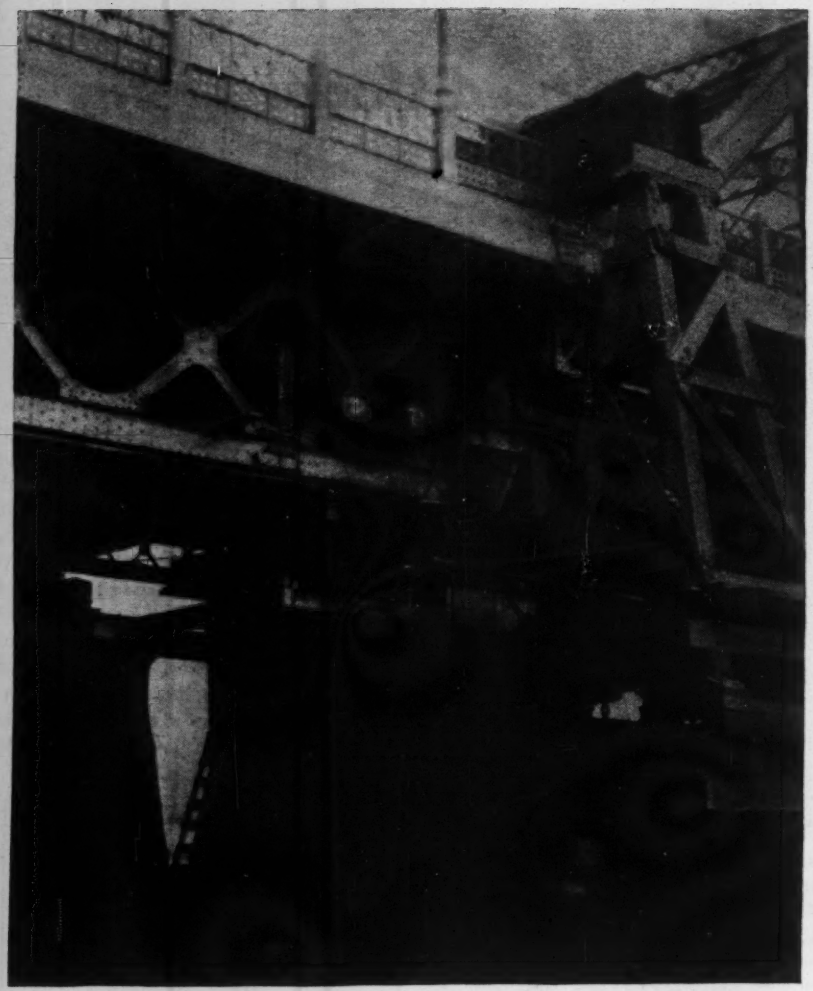


Fig. 2. Steel beams in place above roadway for raising the end of the Pratt truss, which may be seen at the right.

supported some distance above the roadway transverse to the center line of the truss.

The inner ends of the beams above the roadway were supported by steel columns extending down through the roadway to a diaphragm mounted on two 75-ton hydraulic jacks resting on the pier 5 ft. from the center line of the truss. Th outer ends of the beams were carried 11½ ft. from the truss on a timber A-frame resting on eight 25-ton screw jacks.

Location and size of the frame were limited by the nearby railroad tracks, but the base was sufficiently large to reduce the soil load to 600 lb. per sq. ft. Also, less than one-third of the truss load was carried by the A-frame, due to the 11½ to 5 ratio of the distances between the jacks and the truss and the A-frame and the truss.

In adding the lifting straps, a hole had to be cut through the cover plate on the end post of the truss. Before this hole was made a stiffening plate was added at each side of the area where the cut was planned. The ends of the stiffening plates were welded down when the plates had a small bow at their centers. Next, the plates were forced to a straight position by clamps and welded all around. This work placed the plates in compression, and guaranteed that they would carry the stress normally carried by the steel to be cut away.

Lifting equipment tested

In removal of the bearing stone, the timber falsework was first tested as to its bearing capacity. The jacks were extended sufficiently to lift the truss off the pier a short distance and the resultant settlement during the next 24 hr. was recorded. Since the settlement was less than ⅛ in., the job of removing the broken stone was started.

After the falsework had been tested the jacks were extended to raise the truss ½ in. In this operation the two 36-in. beams were kept level, which avoided a twist in the truss. The total load lifted was 623 kips from the truss proper, plus 130 kips from the end floorbeam. This latter load was carried by a 75-ton hydraulic jack carefully calibrated and tested so that the floorbeam was lifted simultaneously with the truss to eliminate the danger of shearing the floorbeam connection.

With the truss raised ½ in., blocking was added to keep the structure at that height and the rusted 3-in. dia. expansion rollers and the old bearing plates were removed, which left a 5-in. space above the bearing stone. By means of a hand winch and A-frame, the old stone was lowered to ground level. This same equipment, aided by chain blocks to swing the load sideways, lifted the new stone into place.

Plates welded in place

After the old bottom bearing plate had been reset, a 1-in. thick steel filler plate and a 1-in. self-lubricating bronze bearing plate were welded to it. Next, a 1-in. thick steel plate was welded to the old bearing plate attached to the truss, which made the total thickness of the new plates 3 in. —equal to the diameter of the rollers removed. As a last step, the truss was lowered into place. Removal of the old rollers and bearing stone and addition of the new parts required two days, once the lifting equipment had been installed and tested.

The bearings under the opposite truss were removed by similar methods. Less than a day's work was required for this truss, once the lifting equipment was ready, as the bearing stone on that side did not need to be replaced.

To replace the expansion rollers below the Warren trusses, which consisted of two lines 10 ft. apart on each side of the bridge, operations were carried out for one-half of the bridge at a time. Pier by pier screw jacks were used to lift simultaneously two lines of the four lines of trusses.

Four 25-ton screw jacks were placed below the first panel point of each truss (Fig. 3). The jacks rested on four 18-in. I-beams 20 ft. long, placed side by side transverse to the centerline of the trusses and sup-

d by an 8-in. solid timber plat- Above each set of jacks four r struts were added, two 12x12- ellow pine timbers and two 0's.

two larger struts were placed e outside of the truss, one on side. They were capped by two I-beams 20 ft. long, transverse plane of the truss, and bearing st the bottom flange of the top The two 10x10-in. struts ex- d up to the bottom flange of the chord. By extending the jacks taneously the trusses were raised equal force on the two chords.

Method permits rapid work

is method of lifting the trusses itted rapid work with a small The scheme of replacing the 3- a. rollers with three 1-in. plates he same for the Warren trusses the 220-ft. Pratt trusses.

at the entire repair project re- d considerable planning is shown e fact that six months were on investigations, planning a actory step-by-step procedure ecuring approval from all the us organizations involved. Con- ion required two and one-half hs. Both preparation of detailed and construction were carried y the Peerless Construction Co.,

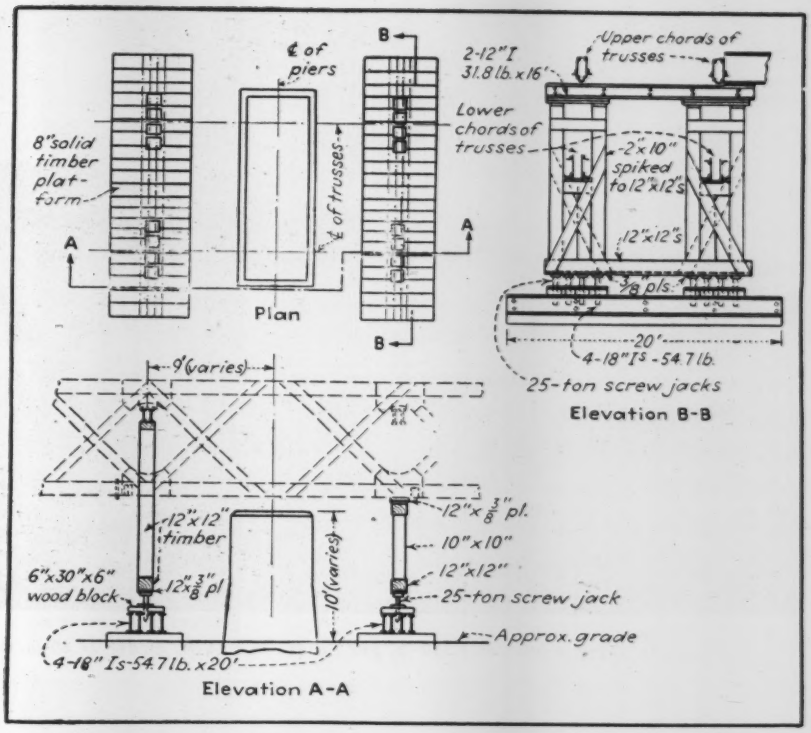


Fig. 3. In adding new expansion shoes for the Warren trusses, operations were carried out pier by pier for one-half of the bridge. The two lines of trusses were raised simultaneously.

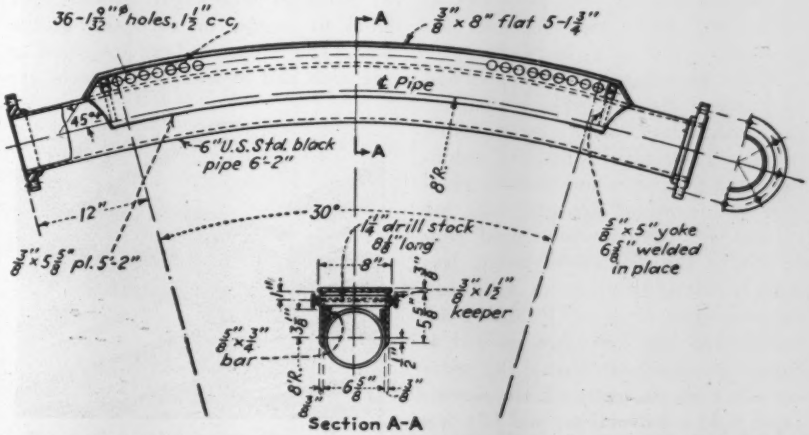
New York, Charles Tyroler, project manager. The work was done for the Bureau of Bridges, New York City Department of Public Works. Clinton D. Hanover is chief engineer for the department.

pe for Delivering Concrete Has Renewable Bend Feature

e problem of wear in the curve pipe used as a discharge line for ering concrete from a pneumatic to tunnel lining forms on the project of the Pacific Gas and ric Co. seems to have been d by a job-made, 30-deg. elbow. used at the upper bend of the arge line where direction ges from the inclined riser to horizontal run along the center e arch forms. The only parts re- d are such as probably could be d in the maintenance shop of any ruction job and assembled on elder's bench.

e idea is to take the wear on s of old drill steel, arranged as n in the accompanying drawing. central hole in the drill steel s a useful purpose because when teel has been worn half way gh, grout will begin to leak from nd of the rod through this hole, thus giving warning that the time for replacement has come.

Any rod or rods can be easily replaced by the removal of one bolt at one end of the "keeper" that holds the rods in place. About 1,000 cu.yd. of concrete, on an average, went through the discharge line before rod renewal was required, according to the contractor's staff.



Replaceable steel rods take the wear in the elbow of a 6-in. pipe delivering concrete.

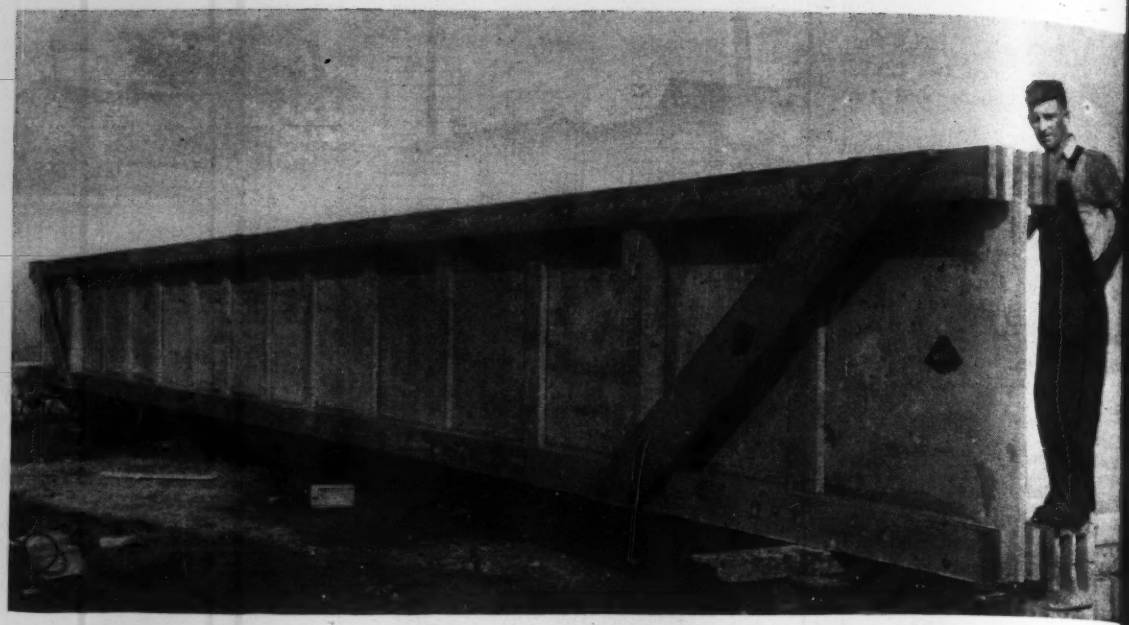


Fig. 1. To carry a load of 1,200 lb. per lin. ft., this 60-ft. girder of 60-in. depth, has a 1½-in. plywood web.

Plywood Plate Girders for Buildings

***Contents in Brief**—Girders with the web a single thickness of plywood and the flanges of dimension lumber are now being used for numerous buildings in the Detroit area. To transfer stress in the flanges to the web, the members are glued together and at intervals maple dowels are added. Not only are metal requirements very low, but lumber demands are said to be greatly reduced over conventional timber construction.*

GIRDERS WITH PLYWOOD WEBS and timber flanges are now being used extensively in the Middle West and the Detroit area, where they are manufactured. The new product, which was introduced late last year, as of Oct. 1, 1943, had been used at over 80 projects.

Many advantages for the plywood girders are claimed. These include: (1) shop fabrication is possible, which permits rigid control of manufacturing processes and assures members of maximum strength; (2) the girders are of extremely rigid construction, the deflection being less than 1/360 of the span at 1,200-psi. extreme fiber stress; (3) lumber demands are low and that needed is commonly available sizes; (4) girders are easy to erect, which permits rapid field construction; and (5) few strategic materials are required.

As shown by the accompanying illustrations, the web consists of a single thickness of standard fir plywood with the outside grain vertical or at right angles to the flanges. The latter, both top and bottom, consist of solid or laminated members of stock fir lumber on each side of the web. The flange timbers are glued to the web and at intervals dowels are added to assist in the distributio the stress. When the first gir were built the flanges were bolte place, but purchase of bolts pr difficult and maple dowels were stituted. Laboratory tests have sh this type of construction to b strong.

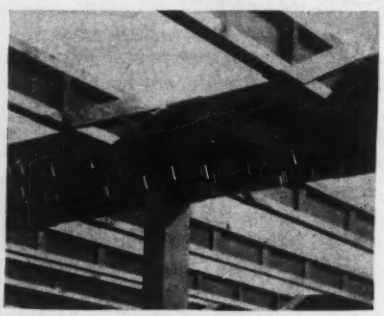


Fig. 2. Steel hangars support the girders and joists at the columns.

Tensional diagonals at each en

In manufacturing the girder diagonal timber tension membe added at each end of the girde transfer the tensile stresses from lower to the upper flange. This agonal eliminates the necessity thickening the webs at the end the beam to resist shear. At first, manufacturer tried to increase web thickness near the ends, but difficulties made this scheme imp tical. The diagonals are attac with split rings and dowels, glue place.

Available in spans varying f 10 to 60 ft., the girders are desig for a maximum fiber stress of 1, psi. Girders capable of carry 3,000 lb. per lin. ft. for spans of 2 and 2,000 lb. per lin. ft. for 6 spans have been fabricated.

When some of the members w

d by Professor H. E. Mayrose at University of Detroit, and Pro- or James Cissel at the University Michigan, they showed a maxi- strength of 4,800 psi. or a ty factor of four.

he general formulas used in com- g the stress were as follows:

$bd - h\,(b-t)$

$\frac{bd^3 - h^3\,(b-t)}{12}$

$\frac{bd^3 - h^3\,(b-t)}{6\,d}$

$\frac{8fS}{l}$ = permissible uniformly distri- d load on member.

$\frac{5\,WP}{384\,EI}$

$\frac{W}{2}$

$\frac{M}{ed}$ = stress in flange, ed = effective of beam or center to center of flanges,

$\frac{V}{\sin \alpha}$ = diagonal stress,

slop of end diagonals with horizontals.

ince the horizontal shear at any nt was directly proportional to the tical shears, neglecting deforma- due to bending, the diagonal ten- members at the ends of the girder e made sufficiently strong to resist of the stresses of moment and total ar at that point. The stress in the gonal was computed by determin- the stress in flanges at the lower of the diagonal and dividing this ss by the cosine of the angle of e or by dividing the total shear the sine of angle of the slope of connection. Since the web contrib- only a small part of the resist- e to shear, the splice plates were igned as short struts to keep the ges in line and to prevent buckling er load.

Plywood joists also used

or use with the plywood girders, ts of similar construction are man- ctured. Some of these members shown in Fig. 5. It should be d that use of plywood girders and ts permits the roofing or flooring be nailed directly to the wide ges without clip angles or special nections being required. Some of joists rest on their upper flanges steel joists and with their center gravity below the support.

o complete a building framework uiring little steel, the girders are nned for use with timber columns. shown by an accompanying draw- the beams are supported by col- ns of construction similar to the ders or each column consists of r vertical timbers joined to a web

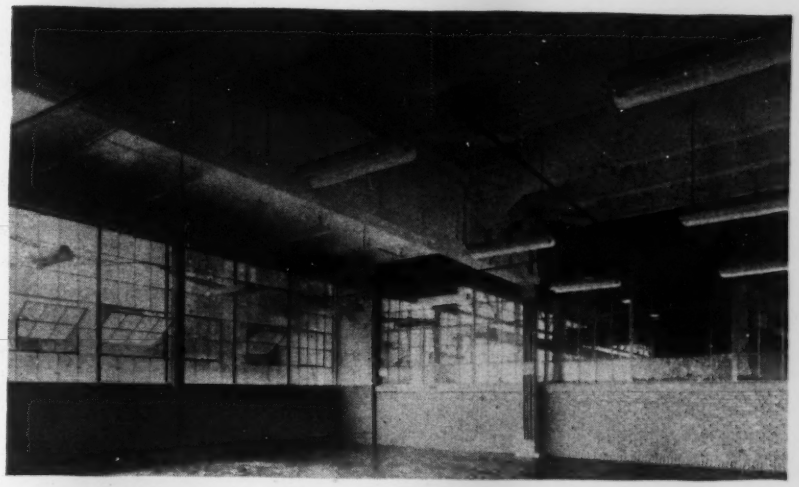


Fig. 3. Main girders for this industrial plant are on 30-ft. centers and of the type shown in Fig. 1. Joists are of a design very similar to girders, and the columns supporting the girders consist of four 2x8-in. timbers. Column at left under lintel over sash is four 3 x 4-in. timbers joined to ¾-in. plywood by maple dowels on a frequent spacing.

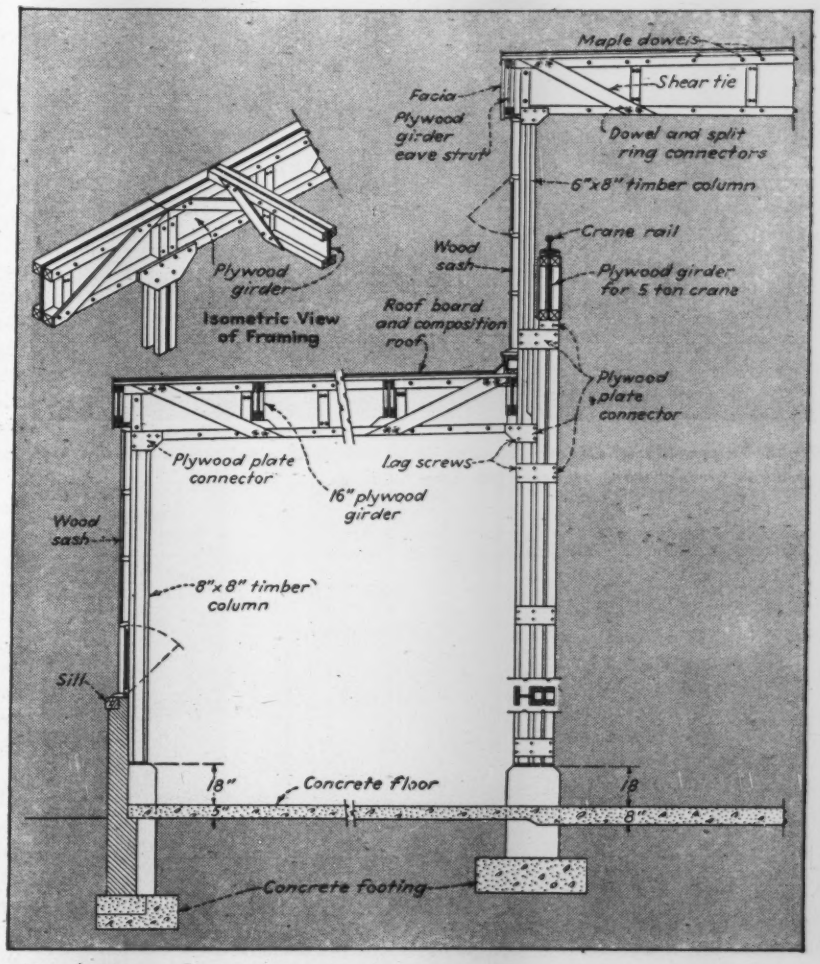


Fig. 4. Typical framing for an industrial plant. Maple dowels are used for connecting plywood web of girders to flanges and very few bolts are required, reducing steel requirements to a minimum.

Fig. 5. Plywood joists for this machine shop span 30-ft. and are 18-in. deep. On 7-ft. centers, they support a load of 280 lb. per lin. ft.

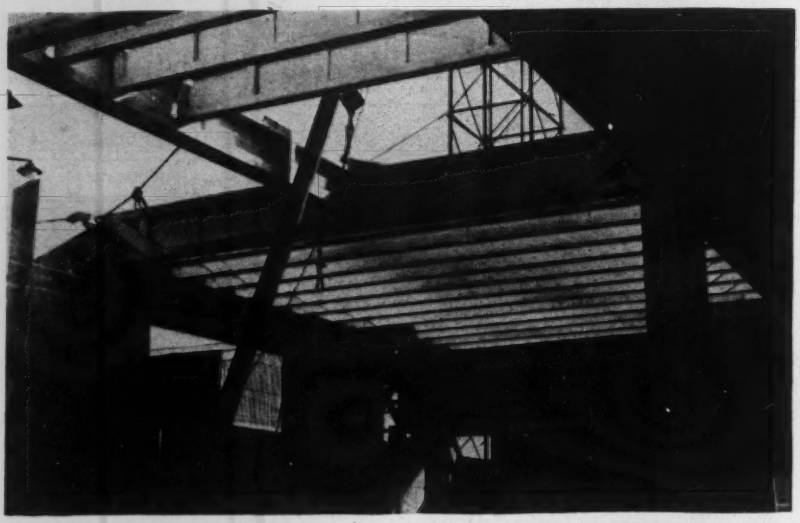


Fig. 6. To provide an elevator opening in an industrial plant several stories high, plywood girders were used for the floor framing.

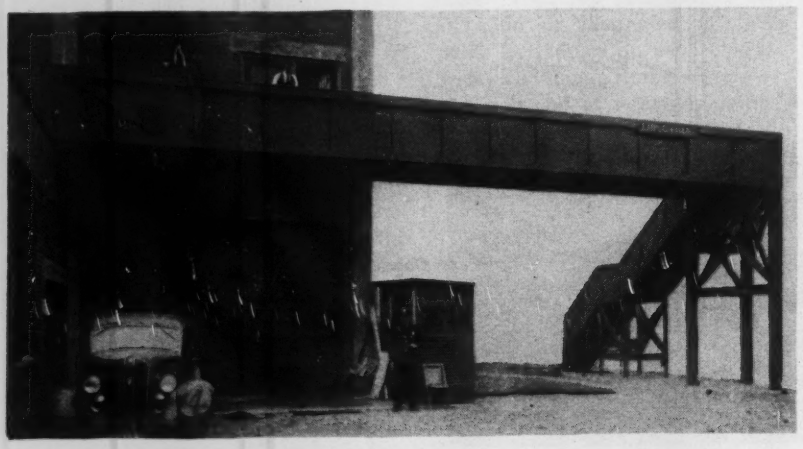


Fig. 7. Plywood girders are considered suitable for outdoor use, as shown by this pedestrian bridge of 52-ft. span. Completed structure was treated with fungus-inhibiting primer and given three coats of oil paint.

of plywood by ¾-in. dia. ma dowels. The permissible bearing load on the columns calculated by the formula $p = \left(1 - \frac{l}{180r}\right)$ where p equals unit b ing load; f_{ic}, maximum allow unit stress; l, unsupported height column; and r, minimum radius gyration. The various methods supporting the girders are shown the illustrations.

One of the most recent illustrati of the plywood girders is shown Figs. 1 and 3. These girders hav 60-ft. clear span and they were signed for a load of 1,200 lb. lin. ft. The web of each membe a 1½-in. thickness of plywood co posed of two ¾-in. thick pieces, each flange consists of eight 2x8 fir timbers, four on each side of web. The webs and flanges are h together by glue and 1⅛-in. maple dowels. To transfer ten stress from the bottom to the flange, and thus resist shortening the lower flange in bending, a 2x in. timber diagonal is used on e side of the girder at both ends. Th diagonals are secured in place split ring connectors. Stiffeners 2 x 6's on 4-ft. centers.

Each of the columns shown s porting the main girders in Fig. which are on 30-ft. centers, consi of four 2x10-in. members; these ti bers also form the end post of girder. To support the lintels o the sash at the left in Fig. 3 an 8- timber H-column is used. This c umn consists of two 3x4-in. timb for each flange joined by a ¾- thickness of plywood. This type column is considered exceptiona strong to resist bending stresses. T joists in Fig. 3 are of constructi similar to the girders.

The girders and joists illustrat are manufactured by Timbeam, In 4086 Michigan Ave., Detroit, Mi The new system was conceived a designed by R. F. Butler, vice pre dent of Timbeam. In proving t design, he was materially aided tests made by the Department Buildings and Safety Engineering f the City of Detroit, under the dire tion of Commisioner Jos. P. Wo and Structural Engineers Chas. Daymude and Robert B. Lytle. Va ous component parts were tested the city's laboratory, and the expe mental data obtained closely che the mathematical design factors us

Hospital Construction in Winter Weather

Contents in Brief—*Because of severe winter weather the brick and tile walls of several hospital buildings were built inside temporary enclosures. Wall and roof panels consisted of tarpaulins nailed over a light frame and their support required only a very light framing along the center of the building. By adding salamanders inside the enclosure and heating the mortar, brick and tile, 96 buildings were built in three months during which the temperature was seldom above freezing.*

DESPITE one of the most severe winters in many years, a Midwest military hospital started in October last year was ready for occupancy in May. By careful planning to provide protection for the foundation and masonry work, construction continued at low temperatures and during several heavy snows. And not only was progress rapid, but workmanship proved to be of good quality.

The project is a 1,500-bed hospital and consists of 121 one-story buildings joined by covered walks, plus a few special buildings. The one-story structures are of similar design but vary in width from 25 to 30 ft. and in length from 120 to 200 ft. The walls are of brick with tile back-up and wood-frame windows and are supported on continuous plain concrete footings. Thickness of the walls is 9 in., except for an increase to 13 in. at 10-ft. intervals to provide pilasters. The roof is trussed rafters covered by 1x6-in. sheathing and strip asphalt shingles.

Construction of the foundations continued during zero weather. Ditches for the exterior wall footings were made with a trencher and immediately backfilled with 20 to 30-in. of straw, which kept the bottom of ditch from freezing. Later, workmen removed the straw, gave the trench its final shape with hand tools and backfilled again with straw as soon as possible.

Concrete for the footings was delivered in large open boxes mounted on sled runners and pulled by crawler tractors. Both water and sand for this concrete were heated with live steam. The concrete left the central mixing plant at a temperature of 70 to 80 deg. F., arriving at the point where needed almost as warm. It was delivered to the trench by wheelbarrow and immediately covered with straw or flooded with 18 in. to 2 ft. of water, whichever was the more convenient; flooding was satisfactory despite very low temperatures, as a thin layer of ice would form at the top of the trench without the water surrounding the concrete freezing.

The concrete-block foundations above the footings were built on warm days with the water and sand for the mortar being heated. Another protection against the cold was to add a small amount of calcium chloride to the mortar. By choosing fairly good days to do this work, the protection provided by these precautions was sufficient.

Fig. 1. Timber frames covered by tarpaulins provide winter protection for the masonry work at an army hospital. Erected quickly with a small crew, the panels required little falsework support.

Fig. 2. Since the roof was not completely covered, good lighting and ventilation inside the enclosure resulted. The coke salamanders and the piles of brick being heated are to be noted.

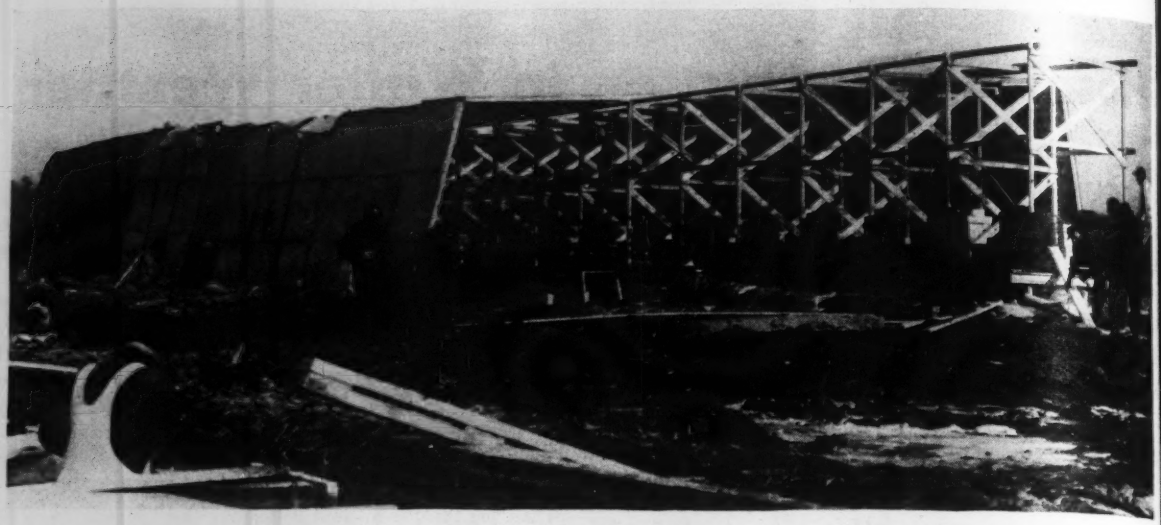


Fig. 3. Falsework for panels was erected quickly, since transverse bents were moved forward as units from site to site.

It was in construction of the side walls that much thought was given to providing protection against the weather. The method that proved most satisfactory was in the use of tarpaulins nailed over light timber frames. The panels permitted masonry work to be continued at a temperature of 20 deg. F., and are of special interest because they could be dismantled with ease and readily moved to a new site.

The panels were 6 ft. wide and of two lengths, about 18 ft. and 10 ft. The frames consisted of a 2x4-in. timber along each side and 1x6-in. cross braces on about 6-ft. centers plus a few 1x6-in. diagonal braces. Each 18-ft. long panel was joined to a 10-ft. panel by two steel hinges nailed to the 2x4's along the sides. This arrangement permitted the 18-ft. panel to be supported vertically outside the building wall while the shorter panel was folded over to provide a roof above where the wall was to be built. In enclosing a site, the panels were placed side by side to make a continuous wall along the walls and across the ends, although a tarpaulin usually had to be draped over the panels to close the corners. To take into account changes in elevation of the ground along the buildings, the lower end of the vertical panels was supported at the desired elevation by nailing 2x4-in. posts of the proper height to the vertical 2x4's of the panel framework.

The inner ends of the panels forming the roof were supported on a temporary framework placed on the subfloor of the building. This frame consisted of two rows of 2x4-in. posts on about a 6-ft. spacing in the longitudinal direction and roughly the same the other way. The posts were joined in the transverse direction by a 1x6-in. strut at top, mid-point and bottom and by two 1x6-in. diagonals.

In the longitudinal direction the posts were joined at the top by a 2x4-in. horizontal timber and at the mid-point by a similar member. Diagonal 1x6-in. braces also were used.

Fig. 4. Special tile of a type that would permit insertion of wooden blocks to which the door and window frames could be nailed eliminated the need for several thousand bolts.

Two wood blocks a short distance apart were nailed on the under side of each of the 2x4's along the sides of the panels. These blocks, one on either side of the longitudinal timber at the top of the falsework, were near the inner end of the roof panels and held the panels fixed to the falsework.

In erecting the panels for the side wall and roof at a new site, once the temporary framing was in place, the panels were raised one at a time by two men on the roof (Fig. 1). They lifted the free end of the roof section by two ropes as three or four workmen shifted the panel into the correct position.

With the entire site enclosed, coke salamanders were placed along the walls on about a 6-ft. spacing. The brick and tile before being used were heated by being piled about the salamanders. Also the water and sand for the mortar were heated with live steam at a central mixing plant: the mortar was delivered by tractor-drawn sleds in 2-cu. yd. batches. Although the roof panels failed to meet at the center of the building by about 10 ft., the salamanders provided sufficient heat to permit the masonry work to continue when the outside temperature dropped to as low as 20 deg. If masonry work for a building was about to be completed and still lower temperatures were experienced, the open space above the center framing was closed by tarpaulins and the job completed. This method was followed in very few cases, however, as ventilation and lighting became difficult.

Three masonry crews were employed on the work within an enclosure. One group of about 30 workers added the brick veneer up to floor level, a second gang laid the brick for the lower part of the wall, and the third crew worked on a scaffold to complete the walls.

The engineers in charge worked out a simple but effective scheme to eliminate bolts in holding the wooden window and door frames in place. The original plan was to bolt the frames to the tile backup, but when calculations showed the entire project would require about 200,000 bolts, a method to avoid the use of bolts was developed. The method consisted of adding special knives to the molds employed in manufacturing the backup tile. At one end of the tile, these knives cut two vertical grooves about 1 in. apart and above seven-eighths the thickness of the tile wall.

In using the tile to provide a nailing point, the portion almost cut away was knocked out and a wooden T-block added as shown in an accompanying illustration. These blocks provided excellent supports to nail the frames in place, and generally three blocks were used at each side of a door and two blocks at each edge of the windows. The special tile could be used elsewhere as a standard unit if desired.

The erection process previously described was reversed when the enclosure panels were dismantled. This work was accomplished rapidly. In taking down the temporary framework along the center of the building only the horizontal members were removed, which left the remainder of the framework in sections that could be easily moved to the next site.

So simple was erection and removal of the panels a crew of 8 carpenters and 4 helpers could dismantle those for a 24x160-ft. structure and assemble them elsewhere in a 9-hr. day. The panels were loaded on sleds and pulled to the new site by tractor. The cost of dismantling the enclosure for a 24x160-ft. building and assembling it elsewhere was estimated at $285 when all work was included.

Not all the masonry work was done under a temporary roof, as on good days the workmen concentrated on those buildings where no protection was necessary. The general practice was to have about six building sites enclosed for inside work in case of a sudden change in the weather.

Fig. 5. Sand required for the mortar was heated by live steam discharged through a pipe network embedded in the bottom of the storage pile. Water for the mortar also was heated by live steam, as shown in the lower picture.

The general contract for the hospital was awarded October 22, 1942 and work started early in November. During the months of December, January, and February, despite considerable snow, several rainy days, and temperatures as low as minus 14 deg. F., a total of 96 buildings were placed under roof and the foundations constructed for 100 buildings. The total labor force averaged about 1,300 men.

The project was carried out by the Huntington, W. Va., District, U. S. Engineers, Colonel Wilson B. Higgins, district engineer, and Major John McGavock, area engineer. The entire project cost about $4,300,000 and the 121 buildings of similar construction $3,000,000, including construction of the covered connecting walks. Cost of the brick work was about $85 per thousand brick with tile back-up. Haig M. Boyajohn & Associates, Columbus, Ohio, held a lump-sum contract for construction of the buildings. Lawrence & Jennings, Columbus, was the architect-engineer.

Manual Welding Technique Developed for Thick Steel Plates

Contents in Brief—A war-industry plant has developed methods of welding 1⅝-in. steel plates by hand without accumulating excessive lock-up stresses. Methods of precutting plate edges, alternating direction of electrode travel and the sequence in plate assembly contributed to success.

EXPERIMENTAL WORK on methods of manual welding of 1⅝-in. thick steel plates at a west coast industrial plant has developed a technique that successfully met the unusual requirements of a wartime job. At the outset there was no precedent—no established methods for satisfactorily accomplishing the desired objective. In the end, however, the smoothness and uniformity of the finished assembly were of even higher quality than has ordinarily been attained with much lighter steel that involves no unusual conditions. Essentials of the problem and its solution are recorded in the following to facilitate wider applications than the specialized field for which the methods were devised.

The problem for solution

The problem was to join thick steel plates, in lengths up to 32 ft., without use of the automatic welding equipment. If machine welding of the submerged-melt type had been possible the resultant completion of the weld in one pass would have avoided repeated reheatings with their attendant tendency to developing internal stresses in the metal. On this job most of the plates are curved in two directions and only hand welding could be used. With electrodes of ordinary size, such as all competent welders are trained to use, this meant about 26 passes.

Standard procedure did not work

Before operations were started on a large scale numerous tests were made on the thick plates joined by conventional welding methods. These welds, which very definitely were not satisfactory because of the stresses resulting from repeated heatings, proved that something more than standard welding procedure was necessary if locked-up stresses of a dangerous order were to be avoided.

A long series of experiments was accordingly carried out, working on the theory that the joining of adjacent plates must be accomplished without at any time developing more than an allowable amount of residual stress. Important factors in the procedure finally adopted are the angles and depths of the precuts in the edges to be joined and the fundamental policy of balancing or opposing the stresses set up by successive operations. The large amount of work to be done on the thick plates made it impracticable to consider highly trained specialists in welding—it was necessary to find methods by which the work could be done with crews of the ordinary well-trained welders such as would be available in considerable numbers.

In describing the results of the experiments, the welding engineer in charge pointed out that proper preparation of the plate edges (which the electric welder calls the "set-up") is a matter of design and should take into account a chemical analysis of the base metal, thickness of the plate, amount of metal to be deposited by the electrode, length of arc, rate of electrode travel proposed and tensile strength of electrode and base material. However, in one sense "design" of the joint is a misnomer because, after all, the method chosen will be a compromise between all these factors influenced by the experience and leaning of the designer.

Basic requirements for success

Not only do the physical properties of materials and the personal equation of welders have to be taken into account, but there are also such practical considerations as the desirability of obtaining maximum smoothness on one face of the finished weld, availability of equipment and the time required for construction. Shrinkage must be expected and while there are approximate tabulations, so many

Fig. 1. Root and back-up beads have been placed in a typical, off-centered set-up of 1⅝-in. plates.

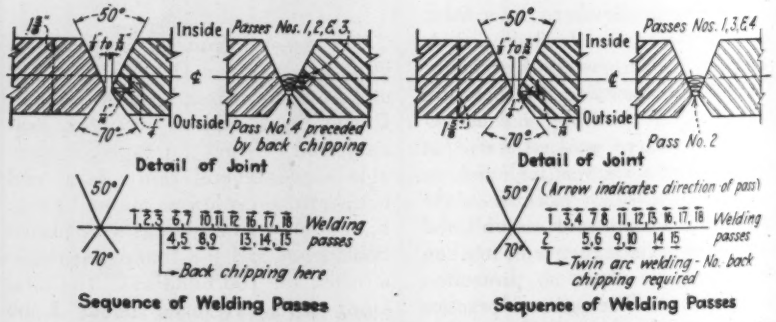


Fig. 2. Typical joint section with sequence of passes where root bead is to be chipped out (left), and a joint section with sequence where "twin arc" plan avoids the necessity for back chipping.

s enter into the picture that no substitute for experience r allowance is to be made in

conventional preparation of e edges was soon discarded ree fundamentals were set s basic requirements for a ul joint in this thick metal. were (1) avoid a bevel that most of the weld metal on e of the joint axis normal to e. This unbalance was found a plane of angular cleavage; oid square shoulders on the hat lead to undercutting and oid vertical faces that give etal a tendency to build up. rea available for placement of etal is inadequate, back chip- o frequently is required.

e base metal is high silicon ere is need for special consid- to the coating or flux used on trode. If there is an excess of and manganese in the flux a ously porous condition can oc- the thermal boundary edge. the result of entrapped gas; ess silicon, unable to combine xygen, forms a sluggish gas does not escape before the metal congeals. This condi- s encountered in experimental n the thick plate welding (Fig. he danger can be entirely d by making sure that silicon of the flux is such that an of this element cannot be car- o the fusion area.

Result of experiments

result of a long series of ex- nts was the set-up shown in 2, namely, symmetrically d edges approaching a narrow n which the root bead would ted to one side of a center line. his preparatory cutting it is e to deposit the root bead in per V; to put on top of it two e additional beads and then, g from the opposite side, to it the root bead, leaving weld in place behind the chipping. int is thus made ready for a of beads in which accretions nearly equal amounts as pos- re put on from opposite sides tely, with continual reversal in on of electrode travel to mini- hrinkage and distortion.

to be noted that in this set-up ngles on opposite faces are different to make the outer

Fig. 3. Surface of break in thermal boundary edge where porosity was caused by gas from excess silicates in rod coating.

width of the weld on the two surfaces somewhere near equal. The base metal used in this work had a tensile strength of 85,000 lb. per sq.in.; the welding rod 60,000 to 70,000 lb. per sq.in. Tests indicated that joint efficiencies of about 80 percent of the plate strength could be expected by the use of this procedure.

An important feature in successful reduction of residual stresses was found to be a moderate amount of preheating (not exceeding 350 deg. F., which is not enough to set up objectionable warping stresses). Heat, applied by torch, is often desirable for scaling off the surface prior to welding. This same equipment with only a little additional application was found to suffice for enough preheating to last until the welding was done. Heat thus applied slowed up a too-speedy cooling (by conduction of welding heat into adjoining cold metal) that otherwise would increase the shrinkage resulting from the welding operation.

Essential plan of joint design

The essential plan in this joint design is to begin near the center of the metal thickness and to work outward toward both faces. Much the same plan governs in assembly of successive plates that make up the finished structure as a whole. That is, there must be no accumulation of stress as the result of the sequence of the welding progresses from the center of a group of plates toward the outer edges. By balancing progress on opposite sides of the center and making symmetrical advances, a minimum of residual stresses are set up and work can be carried on with a minimum of fastening down of plates or jacking up of joints that require to be forced together.

Those in charge of the test

The plant where this experimental work was done and which is completing its war contracts by the methods described is operated by the Western Pipe & Steel Co. The work was done under the direction of W. L. Hanscom, chief engineer, and M. R. Ward, plant manager. Walter J. Thomas, welding engineer at this plant, personally directed the experimental work. Government representatives who supervised the work were Capt. Albert Norris, U.S.N. (Ret.) and Capt. F. A. Tusler, supervisor of shipbuilding, U. S. Navy.

Reducing Temperatures in Railway Tube Tunnels

Increased traffic on the tube lines of the underground railway system in London (England) is found to result in rising temperatures in the tunnels, and has necessitated the provision of additional ventilating fans at many of the stations. According to the "Railway Gazette" (London), the heat generated by trains, escalators and other machinery is dispersed in various ways, some being carried off by air currents and some passing through the cast-iron or concrete lining into the clay formation, where it is slowly dissipated. In order to reduce the temperature in this belt of warm clay, it is desirable to ascertain the actual heat, for which purpose experiments are in progress on a section of new tunnel, before traffic begins the warming-up process. Electric resistance thermometers are inserted in §-in. holes drilled through the lining and 3 to 4 ft. into the clay, and wires connect the thermometers with recording instruments at the surface. The records or charts will be run for several months. This work is being done by the engineers of the London Passenger Transport Board for the purpose of improving the ventilation of the tube railways.

From Field and Office

WORKING PROBLEMS AND TIME-SAVING METHODS FOR ENGINEERS AND CONTRA

Accurate Cube Root by Use of the Slide Rule

Sir: The writer has read with much interest the simplified method of extracting square roots by slide rule, as presented by R. W. Stewart in *Engineering News-Record*, Aug. 26, 1943, p. 353. It is possible to extend the method to the extraction of a cube root in the following manner:

Let $x = x_1 + dx$

Then $x^3 = x^3_1 + 3x^2_1 dx + 3x_1 dx^2 + dx^3$

Whence $dx = \dfrac{x^3 - x^3_1}{3(x^2_1 + x_1)}$ (Approx.)

As an example, extract the cube root of 71,215.68. From tables, determine the number, x_1, whose cube is nearest this value, then

$x_1 = 41.40$	$x^3 = 71{,}215.68$
$x^2_1 = 1713.96$	$x^3_1 = 70{,}957.94$
$(x_1 + x^2_1) = 1755.36$	$\therefore 3(1755.4)dx = 257.74$

Whence, by slide rule: $dx = 0.049$

And: $x = 41.44900$ (Answer)
$x = 41.45006$ (Exact Value)
$x = 41.45100$ (By 5-place logs)

The approximate method is as accurate as the logarithmic solution and is convenient when logarithmic tables are not readily available.

In the event a greater degree of accuracy is required and a calculating machine is available, the cycle can be repeated by using for x_1 the approximate value computed by slide rule, thus:

$x_1 = 41.4490$	$x^3 = 71215.6800$
$x^2_1 = 1718.0196$	$x^3_1 = 71210.1944$
$x_1 + x^2_1) = 1759.4686$	$3(1759.4686)dx = 5.4856$

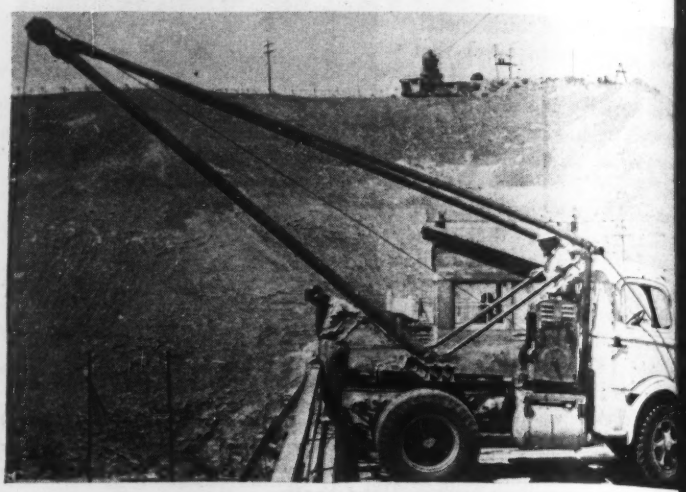
Whence, by machine: $dx = 0.00104$

And: $x = 41.45004$
$x = 41.4500643$ (Exact Value)

The above method may prove of interest.—D. A. DUPLANTIER, *Chief of Structures, Consolidated-Vultee Aircraft Corp., Nashville (Tenn.) Division.*

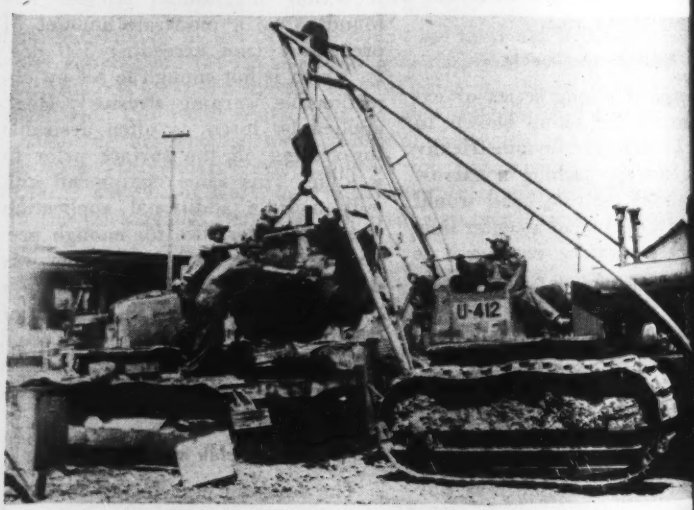
A Job-Made Cherry Picker

A cherry picker used at Keswick Dam, one of the U. S. Bureau of Reclamation projects, consists of an A-frame built up by welding old pipe together and mounting it on a truck body with a hoist operated by a gasoline motor. To avoid necessity for tying down the opposite end of the truck when the A-frame picks up a heavy load, a metal counterweight weighing about 2,500 lb. is slung from the front bumper. The bumper is a 110-lb. section of T-rail to the forward end of the truck sis and tied to the A-frame by steel rods. The tie rods give the erstructure desired stability.



A job-made cherry picker with the A-frame built of old pipe. A 2,500-lb. counterweight is slung from the front bumper.

INTER-AMERICAN HIGHWAY PROBLEM SOLVED BY JOB-MADE CRA

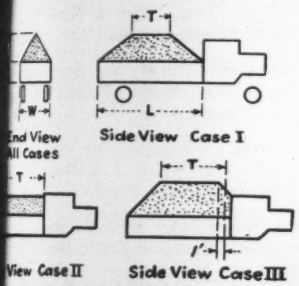


The Ralph E. Mills Co., Roanoke, Va., on construction of 71 miles of the American Highway in Costa Rica for the Public Roads Administration, construct on the job much repair equipment. This all-welded derrick attac was made in a very short time at little cost for handling small loads. Although it could not "swing" a load, the attachment proved so effective two other tractors were equipped in a like manner. The work was done und direction of Albert Rinella, superintendent of equipment.

rate Formula to Determine Load on Trucks

perience has shown that few eers ever get the same quantity measuring the same truck load l. Most methods of measuring are very approximate and when ined with the empirical formula y used, produce varied and in- t results. For instance, the recently allowed 6 cu.yd. for a ruck load of loam, whereupon ontractor objected on the evi- that the state engineers had al- 6½ cu.yd. and the federal gov- nt workers had recently allowed yd. for the same truck equally d with loam. Another engineer this office was asked to measure ruck, to settle the dispute, and thods little better than a guess lowed the hauling contractor d. for the load.

the writer it appears that this ion of ½ to 1 cu.yd. per load is ive and entirely unnecessary. standard procedure should be



calculating the loads on trucks g earth, three general types of g are assumed. Care must be ex- d in choosing the correct value mession T.

lished whereby all engineers d obtain, very nearly, the same s.

comply with this the writer sub- the following procedure and ula for consideration. The form- as been tested and found to be y correct, allowing all reason- benefit of doubt in favor of the ctor without being appreciable cess.

the formula:

d. of load = $.0062W[2L(3D+H)$ $H]$ cu.yd., where W, L, D, H, and dimensions, in feet, as shown by accompanying sketch. For ex- e, assume: $W=5.6$ ft.; $L=7.9$ $D=3.0$ ft.; $H=1.4$ ft.; and $T=$. Then the load = $(.0062\times5.6)$ $[(2\times7.9)$ $(3\times3.0+1.4)$ $+(3.1\times1.4)] = 5.9$ cu.yd.

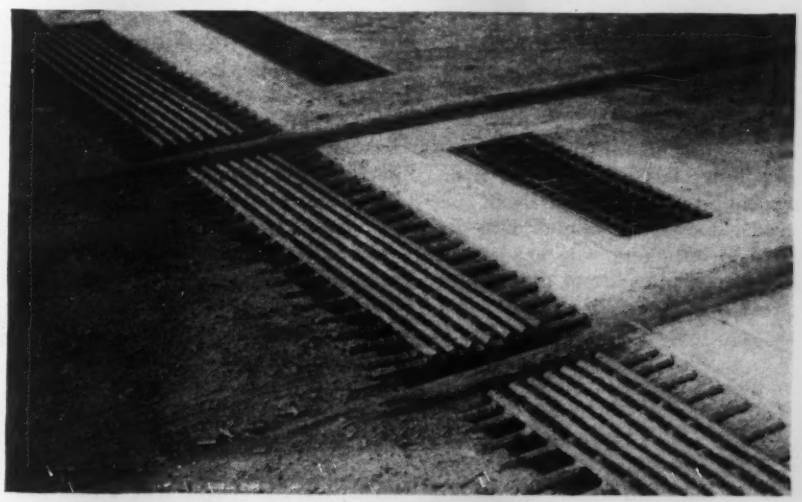
Derivation of the formula would require too much space to be reproduced. It was obtained by dividing the load into several truncated rectangular and triangular prisms and calculating accurately the volume of each prism.

The formula is applicable for all types of materials. Although the different soils will assume different slopes, the formulas will apply regardless of the type or the moisture content of the soil. The load is measured at the unloading site.—NEAL B. MITCHELL, *Engineering Dept., City of Salem, Salem, Mass.*

CAMERA MEMORANDUM

When they needed a flat bed truck, engineers of the Ralph E. Mills Co., contractors for 71-mi. section of the Inter-American Highway in southern Costa Rica, built one by means of the job-made "goose neck" above. It is of all-welded construction, local laborers having done much of the work.

REMOVABLE GRILLAGE USED OVER DRAIN AT SHASTA DAM



A utility conduit that had to be left open temporarily across a roadway at the entrance to Shasta powerhouse required some sort of cover that would permit trucks delivering machinery to cross anywhere. In addition the cover had to be one that could be lifted up readily and one not interfering with access to the passageway beneath.

These requirements were met by welding together at right angles two layers of old reinforcing steel, which made convenient panels of ample strength. One panel was built to fit between rails of a standard gage railroad that runs into the plant. (Concrete of powerhouse floor is seen at right.)

Book Notes and Reviews

The month's addition to the engineer's reading and reference list

About Foundations

FOUNDATIONS, ABUTMENTS AND FOOTINGS—Second Edition. By George A. Hool and W. S. Kinne, revised by R. R. Zipprodt and E. J. Kilcawley. 417 pp. McGraw-Hill Book Co., New York and London. $4.

THIS SMALL TEXT on foundations has been extensively revised to give recognition to the new knowledge of soils that has been gained since the first edition was written in 1923. The section on excavation contains much new material, chiefly about excavation work other than that directly related to foundations. One of the most valuable elements of the revised text is the discussion of formulas for determining the bearing power of piles, contained in Appendix B.

For Shipbuilders

SHIP WELDING HANDBOOK—By Martin J. Coen. 495 pp. Cornell Maritime Press, New York. $3.50.

SHIP OUTFITTER'S HANDBOOK—By Emil M. Hansen. 282 pp. Cornell Maritime Press, New York. $3.

SHIP WIRING—By John E. Scull. 218 pp. Cornell Maritime Press, New York. $2.

BLUEPRINT READING FOR THE SHIPBUILDING TRADES—By August E. Niederhoff. 84 pp. McGraw-Hill Book Co., New York and London. $2.

GLOSSARY OF SHIPBUILDING AND OUTFITTERS TERMS—By Walter J. Eddington. 434 pp. Cornell Maritime Press, New York. $3.50.

THE GREAT RISE in shipbuilding in this country has brought with it the preparation and publication of numerous books on shipbuilding designed to aid those who are new to the field or to facilitate the application of new techniques to ship construction. (See also *ENR* Oct. 8, 1942, p. 506). The "Ship Welders Handbook" falls into the latter class. It will, however, be found useful in the entire field of structural welding as about three-fourths of the book relate to basic principles of welding and to descriptions of types of welds and welding equipment.

The four other books are addressed primarily to newcomers in the shipbuilding field. Hansen's "Ship Outfitter's Handbook" is given over in large part to illustrations, being supplemented by 17 large folding plates. The book on blueprint reading, similarly, is largely illustrations. In it, photographs are used effectively to help the reader visualize the detail shown in the blueprints.

Clear Thinking

OUT OF THIS NETTLE, DANGER—By Harold W. Dodds. 58 pp. Princeton University Press, Princeton, N. J. $1.

IN NO SENSE is this little collection of essays by the President of Princeton University an engineering text. Comment on it is included here in the belief that many of our readers will find it helpful in organizing their thinking about the postwar period. Especially notable is the clear statement about public work programs and job security in the chapter entitled "Democracy's Challenge to Private and Community Enterprise."

War Transport

TRANSPORT FOR WAR—By Edward Hungerford. 272 pp. E. P. Dutton & Co., New York. $3.

THE large but little known part that the nation's transportation agencies are playing in the war is ably set forth in this book by the nation's foremost writer of railroad history, Edward Hungerford. Because the railroads are carrying by far the greater part of the load, most of this account relates to their activities, the part of the water carriers, trucks, buses and air transport agencies being outlined only sketchily.

About half the book is historical, fascinating little sketches of the part transport played in earlier wars, such as the movement of the Eleventh and Twelfth Army Corps from the Potomac to Tennessee via Wheeling and Indianapolis during the Civil War—the first great troop movement by rail in all history. Troubles of the railroads during World War I also are reviewed.

Most readers will learn with surprise that the cooperative arrangement between the Army and the railroads by which troop movements now amounting to about a million a month are made began not with Pearl Harbor but back in 1940. When Pearl Harbor came, the machinery was all in smooth running order. Within days the greatest troop movement the country's history up to that was made. Still greater ones follo in quick succession.

Throughout the book the cont between conditions today and th of 1917–18 is apparent. Also parent is the fact that the railro learned well the lessons taught their unfortunate experiences World War I. As a result we h a transportation system that has b able to carry the unprecedented put on it without a major breakd

New Engineering Books

FOUNDATIONS, ABUTMENTS AND FOOTI By George A. Hool and W. S. K Second Edition. Revised by R. R. prodt and E. J. Kilcawley. 402 McGraw-Hill Book Co., Inc., New Y and London. $4.

MATERIALS AND METHODS OF ARCHI TURAL CONSTRUCTION—Second Editi By Charles M. Gay and Harry Pa 622 pp. John Wiley & Sons, Inc., N York; Chapman & Hall, Ltd., London.

ELEMENTARY SURVEYING—Second Editi By William Horace Rayner. 409 pp. Van Nostrand Co., Inc., New York.

GLOSSARY OF SHIPBUILDING AND OUTFIT TERMS—By Walter J. Eddington. 434 Cornell Maritime Press, New York. $3.

SHIP WIRING—By John E. Scull. 218 Cornell Maritime Press, New York.

SHIP OUTFITTER'S HANDBOOK—By Emil Hansen. 282 pp. Cornell Maritime Pre New York. $3.

SHIP WELDING HANDBOOK—By Martin Coen. 495 pp. Cornell Maritime Pre New York. $3.50.

BLUEPRINT READING FOR THE SHIPBUILDI TRADES—By August E. Niederhoff. pp. McGraw-Hill Book Co., New Yo and London. $2.

HANDBOOK OF CONCRETE CONSTRUCTIO Eighth Edition. 257 pp. Universal At Cement Co., 135 East 42nd St., N York.

SLIDE RULE SIMPLIFIED—By Charles O. H ris. 250 pp. American Technical S ciety, Chicago. $2.50; with slide r $3.50.

MUNICIPAL AND RURAL SANITATION—Thi Edition. By Victor M. Ehlers and Ern W. Steel. 433 pp. McGraw-Hill Book C Inc., New York and London. $4.

STUDIES IN ARC WELDING—Papers subm ted in the 1940-42 Progress Award Pr gram. 1,289 pp. The James F. Linco Arc Welding Foundation, Clevela $1.50 in U. S. A. $2 Elsewhere.

(*Continued on page 155*)

Free Enterprise

WHAT IS IT? HOW DOES IT WORK?

☆

URS is a free-enterprise economy the chief motivating forces of which are the prospective rewards effort and risk-taking. Its smooth operation depends: st, on adequate incentives for risk-taking, innovation, d individual effort; and second, on sufficient competin to minimize the need for government regulation d to prevent artificially high prices or wages from ing maintained in large segments of the economy. ouble comes when these incentives and this competin are tampered with or removed.

America was founded by men who had the urge to tter themselves and the courage to take a chance. hese men uprooted themselves in Europe and braved e unknown. They risked all for freedom. They knew at, to be free, they had to attain economic freedom. heir goal was an economic freedom which permits the ivate ownership of property, the free choice of jobs, d free entry into entrepreneurial pursuits. Their forts, therefore, were directed toward individual opportunity with no limit on individual achievement. heir foresight and the endeavors of those who followed them created the world's greatest industrial tion enjoying the highest standards of living.

We can take pride in the knowledge that our country s been the greatest single contributor to the world's ysical assets even though we remember that an abunnce of natural resources contributed materially to merica's economic development. But the fact that our ogress has been interrupted, again and again, by dessions which resulted in enormous wastes of our man and material resources is sobering proof that r economic mechanism still is far from perfect.

Our production per man-hour has been increasing at e rate of 2½% per year. Improved machines and eater efficiency have more than tripled the output per our of work since 1900. Looking to the future, this nual rise indicates that our production per hour of ork will double in the course of the next 25 to 30 ars. This means that we can have twice our present lume of goods and services per capita or an equivalent combination of more production and more leisure. In other words, we can further increase the living standards and further decrease the working hours of the American people by further intensifying our industrial efficiency.

This is no idle dream. It can be achieved, and it will be achieved, if only we maintain the essential features of our system of individual enterprise which alone makes possible this near-utopian goal. Intensification of our efficiency, however, means that we can have full employment only if we expand enormously our production, and particularly our production of new goods. We can expand total production only if we have the markets and the demands for the vast output of goods and services made possible by our technological development. To attain these, we will need to venture into new markets, new inventions, and new methods. Such ventures involve risks, and risks will be taken only if there is sufficient prospect of reward.

Let us never lose sight of the fact that the essential features of free enterprise are the prospective rewards for risk-taking as well as for effort.

The evidence is clear that incentive methods of wage payments will boost production. Carefully devised systems of salary payment with large differential inducements for superior performance have been powerful means of raising the standards of managerial accomplishment.

Free enterprise cannot operate effectively unless the wage and salary system offers greater rewards for greater effort. Neither can it operate effectively unless the prospects for profit are sufficient to encourage the employment of resources which otherwise would be kept idle.

Unless the prospects of profit are superior to the prospects of loss, new ventures will not be undertaken and going concerns will not expand or continue long in business. When the hope for profits wanes, employment and production slump; when that hope revives, employment and production recover.

Business initiative must be given every possible in-

ducement in order that maximum employment may be achieved through private enterprise. This involves the removal and avoidance of restrictions on business by government, by labor, and by business itself.

Competition is the life-blood of the free enterprise system. Business and industry must rely upon efficiency rather than upon protection from competition for their survival.

Those government controls which were made necessary during the war by the magnitude of government demands for goods should be lifted at the earliest possible moment. As soon as the danger of inflation has receded, price controls must be removed and profit margins again left free to be determined by market forces. The excess profits tax must be repealed and the burden of other taxes on business profits greatly reduced. Tax laws should be revised so as to permit adequate rewards for assuming risks. The modernizing of anti-trust laws and their vigorous enforcement, not indiscriminate persecution, will be supported by all who really want free enterprise. Such measures will strengthen the incentives to expand old businesses and to start new ventures.

Grants of unlimited monopoly powers to labor unions which enable them, consciously or not, to sabotage the profit incentive in business must be withdrawn. Labor has certain legitimate rights; and in order to preserve them and its freedom, labor must come to realize that its best interests lie in a well functioning, self-disciplined competitive free-enterprise economy.

There must be evolved in the minds of business, labor, and the public a recognition of the need for private business enterprise and a realization that policies which throttle it are harmful not only to businessmen but to workers and consumers as well. Unless we achieve this understanding and avoid needless deterrents to business expansion, we are likely to pay for our folly in the destruction of our free enterprise system.

We cannot tolerate conditions in which special interest groups in business, labor, agriculture, or politics prevent free access to the market by would-be competitors. Such monopolizing of opportunities stifles progress and creates profits or wage rates based on artificial scarcity. In such cases government interference to open the market to all comers is clearly indicated. We must recognize the need for constructive policies by business, labor, and government which will insure the competition necessary for the successful operation of our economy.

Increased government regulation and control of business activities is not conducive to strengthening the virility of private enterprise. Government ownership and operation of productive resources certainly is not to be condoned. The more government rules and regulates business, the less will be the incentive to assume risks and to exercise individual initiative. Government regulation of the detailed operation of industry inhibits progress, is prey to political pressures, and is subject to the human failings of its administrators: *Better far the rough guidance and justice of vigorous, though some what imperfect, competition than the uncertainty arbitrary regulation.*

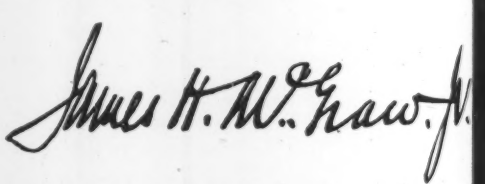
The gravest threats to our competitive system co in legalized monopolies, such as the N.R.A. once co prised, such as the labor unions and farm groups ha recently achieved, such as businessmen themselves ha sometimes sought. The power of labor monopolies encroach on business profits will tend to interfe seriously with the needed flow of new investment. A when any group is strong enough to move the aver level of costs as much as the labor groups and the far groups are able to do, there is good reason to fear th when we begin to approach high levels of employme and production in time of peace, these groups will duce a price-wage spiral which will waste money comes on price increases instead of permitting them draw unemployed resources into production. While t demands of labor for collective bargaining rights a the demands of farmers for protection against the rig of depression have validity, there can be no reason f excessive grants of power and privilege which threat to make our system of free enterprise unworkable.

Ours is a complex economic structure. The functio which prices, income, savings, investments, and tax play in this system are difficult to comprehend.

As I have said before: Thinking is hard work, and w will have to work hard if we are to develop busine policies, labor policies, and government policies whi will insure full employment and the opportunity fo consistent profit. Yet only through such policies can w guarantee that private enterprise will be the predom nant source of jobs, income, and production.

Even more difficult than thinking, and more impo tant, is the implementation of many policies that a in the interest of the free enterprise system. Not a measures will satisfy all people. Special interests wi have to be subordinated to the total interests of th nation. Sacrifice and vision have been essential to th winning of the war. They will be no less essential t the winning of the peace.

If we can gain recognition of the crucial role of in centives for enterprise, if we stand squarely for com petition and against protection or privilege for speci interests, and if we bend our efforts to find satisfacto ways and means to prevent large-scale unemployment we can have the full benefits which only a free ente prise system can produce—in industrial progress, in im proved standards of living, and in the preservation o our democratic ways of life.



President, McGraw-Hill Publishing Company, Inc.

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CONTRACT UNIT PRICES

What contractors are bidding on different kinds of construction work

AIRPORT, FLORIDA

OWNER: Civil Aeronautics Administration, Atlanta, Ga.

PROJECT: Grading, drainage, grubbing, fencing, seeding (Schedule I) and paving (Schedule II) of Titusville-Cocoa Airport, eight miles south of Titusville, Brevard County, Fla. Includes paving of four 5,000-ft. runways, and clearing of 550 acres. Runway and taxiway base to consist of crushed coquina rock, water bound, with 1½-in. hot mix surface; or 8-in. limerock base course as shown in alternates in tabulation of unit prices below. Coquina rock for base varies in thickness and may require extensive quarrying operations.

CONDITIONS: Contractor to furnish all material and complete entire project in 150 calendar days (130 days for Schedule I; 90 days for Schedule II). Highway transportation facilities available adjacent to project; railroad facilities eight miles from site. Wage rates are: skilled labor, $1.125 to $1.375 per hour; semi-skilled, 50c. to $1.00; and common, 50c.

BIDS: Six bids were received August 5, 1943 on Schedule I, ranging from the contract low of $405,626 to $498,711. Engineer's estimate, $396,552. On Schedule II (no award as yet) nine bids were received on the same date, two on the coquina rock alternate, and seven on the limerock base course alternate. They range from the low of $554,578 to $901,380.

Schedule I—Preparation of Site

LIST OF BIDDERS:

1. Simpson Constr. Co., Daytona Beach, Fla. (contract) $405,626
2. B. B. McCormick & Sons, Jacksonville, Fla 457,625
3. The Grandview Co., Mt. Vernon, N. Y. 457,835
4. R. A. Bowen, Macon, Ga. 468,271
5. Hall & Caddell, Jacksonville, Fla 495,980
6. Marion Contracting Co., Ocala, Fla. 498,711

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Clear, grub and plow	335 ac.	$150.00	$240.00	$230.00
2. Clear airport area	217 ac.	85.00	125.00	150.00
3. Clear outside airport	100 ac.	85.00	125.00	140.00
4. Grading	540,000 c. y.	.26	.31	.30
5. Borrow	10,000 c. y.	.38	.31	.45
6. 10-in. conc. drain lines	200 l. f.	1.30	1.75	1.10
7. 12-in. conc. drain lines	4,770 l. f.	1.55	2.00	1.65
8. 15-in. conc. drain lines	4,020 l. f.	2.40	2.25	2.30
9. 18-in. conc. drain lines	3,520 l. f.	3.15	3.00	2.70
10. 24-in. conc. drain lines	3,540 l. f.	4.35	4.50	4.10
11. 30-in. conc. drain lines	670 l. f.	6.60	5.50	6.00
12. Type A catchbasins, in place	36 ea.	100.00	140.00	150.00
13. Type B catchbasins, in place	20 ea.	165.00	200.00	200.00
14. Type C catchbasins, in place	1 ea.	210.00	300.00	300.00
15. Concrete, headwalls (1:2:4)	100 c. y.	35.00	40.00	40.00
16. 6-in. open joint tile sub-drain	500 l. f.	1.00	1.50	1.50
17. Conditioning	225 ac.	35.00	60.00	50.00
18. Muck excavation and storage	5,000 c. y.	.45	.50	.40
19. 1½-in. muck blanket	5,000 c. y.	.50	.50	.45
20. 1½-in muck blanket (from airport property)	20,000 c. y.	.50	.90	.70
21. 1½-in. muck blanket (outside airport property)	20,000 c. y.	.60	1.00	1.00
22. Fertilize and seed	225 ac.	50.00	60.00	70.00
23. Fertilize and sprigg	225 ac.	100.00	125.00	110.00
24. Watering	6,110 M gal.	2.50	2.00	2.00
25. Class C fence	1,350 rd.	4.50	5.00	5.00
26. 12-ft. steel gate	2 ea.	75.00	75.00	70.00
27. Cattleguard, in place	1 ea.	125.00	300.00	200.00
28. 2-in. underground duct	11,200 l. f.	1.30	1.00	1.10
29. Stabilizing material	15,500 ton	3.75	1.00	1.50

Schedule II—Paving

LIST OF BIDDERS:

Alternate II—8-in. Crusher Run Coquina Rock

1. John Monaghan, Inc., Pellham, Ga. (low bidder) $554,578
2. Jay W. Craig Co., Minneapolis, Minn. 662,140

Alternate I—8-in. Limerock Base Course

3. B. B. McCormick & Sons, Jacksonville, Fla 709,463
4. Marion Contracting Co., Ocala, Fla 731,953
5. R. A. Bowen, Macon, Ga. 745,188
6. L. J. & W. L. Cobb, Inc., Tampa, Fla. 745,388
7. John E. Ballenger Constr. Co., Lakeland, Fla. 769,853
8. Hall & Caddell, Jacksonville, Fla. 793,962
9. James H. Craggs Constr. Co., Ocala, Fla. 901,380

Alternate II—Coquina Rock Base Course

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Base course aggregate	412,000 s. y.	$0.82	$1.09	.....
2. Prime base course, RT-3	136,000 gal.	.15	.15	.....

Alternate I—8-in. Limerock

1. Aggregate, base course	412,000 gal.	.....	$1.44	$1.34
2. Prime base course, RT-3	136,000 gal.	.....	.15	.125

Surface Course—1½-in. Hot Mix

1. Tack coat, asphalt cement	65,300 gal.	.12	.12	.100
2. Aggregate, surface course	30,600 ton	3.64	3.40	3.42
3. Asphalt cement	566,000 gal.	.0985	.10	.097
4. Seal asphalt, RC-2	81,600 gal.	.12	.115	.11
5. Aggregate, seal coat	2,900 ton	3.75	4.50	3.50
6. Driveway surfacing	1,400 s. y.	.50	1.25	1.00

SURFACE AREA AND ACCESS ROAD, CALIFORNIA

OWNER: California State Division of Highways, Sacramento; G. T. McCoy, state highway engineer.

PROJECT: Constructing surface area and access road near Honey Lake, Calif. Consists of graded area 500-ft. wide and 9,000-ft. long; placing imported borrow from 6 to 31-in. depth; placing plant mix surfacing over area 150-ft. wide by 6,700-ft. long; and paving 150-ft. long with plain cement concrete at each end of surfaced area.

CONDITIONS: Contractor to furnish all materials and complete project by November 15, 1943. Rail transportation facilities available. Wage rates are: skilled labor, $1.25 to $1.75 per hour; semi-skilled, 90c. to $1.20; and common, 85c.

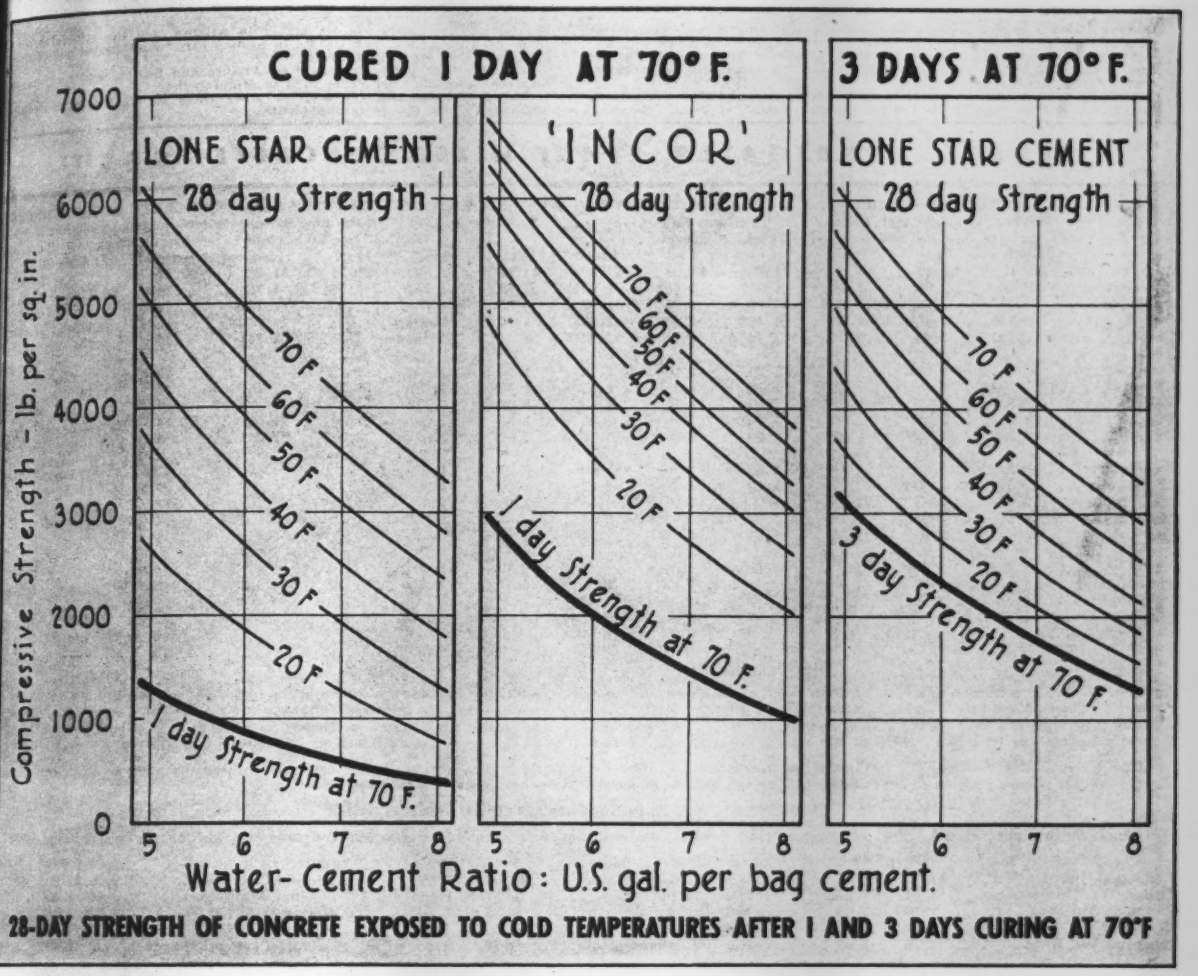
BIDS: Six bids were received August 27, 1943, ranging from the contract low of $521,901 to $914,870.

LIST OF BIDDERS:

1. Radich & Brown, San Leandro, Calif. (contract) $521,901
2. E. B. Bishop, Orland, Calif. 582,125
3. A. Teichert & Co., Sacramento, Calif. 592,333
4. Parish Bros. and A. S. Vinnell Co., Sacramento, Calif 611,202
5. R. A. Westbrook, Sacramento, Calif. 767,786
6. Bressi & Bevanda Constructors, Inc., Los Angeles, Calif. 914,870

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Clearing and grubbing	153 ac.	$23.55	$50.00	$30.00
2. Roadway excavation	84,000 c. y.	.238	.33	.25
3. Ditch and channel excavation	10,000 c. y.	1.02	.25	.25
4. Structure excavation	40 c. y.	3.27	1.50	2.00
5. Overhaul	400,000 sta. y.	.02	.005	.008
6. Compacting original ground (Type A)	116,700 s. y.	.08	.06	.05
7. Compacting original ground (Type B)	410,600 s. y.	.03	.02	.02
8. Imported borrow	445,000 ton	.43	.60	.58
9. Preparing subgrade (conc. pavmt.)	5,000 s. y.	.16	.10	.10
10. Develop water supply and furnishing watering equipment	Lump Sum	19,618.00	5,550.00	10,000.00
11. Applying water	31,000 M gal.	2.59	1.75	1.20
12. Finishing construction area	Lump Sum	4,420.00	2,500.00	11,000.00
13. Crusher run base	38,500 ton	1.39	1.75	2.60
14. Liquid asphalt, MC-5 (seal coat)	132 ton	29.84	25.00	28.00
15. Screenings (seal coat)	1,000 ton	3.40	3.00	4.00
16. Liquid asphalt, MC-2 (prime coat)	132 ton	29.84	25.00	25.00
17. Mineral aggregate (plant-mix surf.)	24,000 ton	2.07	3.00	3.00
18. Paving asphalt (plant-mix surf.)	1,300 ton	25.17	22.00	22.00
19. Liquid asph., MC-3 (PMS stock piles)	10 ton	5.88	30.00	32.00
20. Cl. B plain cement conc. (pavement)	1,060 c. y.	13.47	18.00	18.00
21. 24-in. un-rein. concrete pipe	48 l. f.	6.50	5.75	4.50

'INCOR' SOLVES WINTER PROBLEMS



28-DAY STRENGTH OF CONCRETE EXPOSED TO COLD TEMPERATURES AFTER 1 AND 3 DAYS CURING AT 70°F

USE 'INCOR'... CUT COSTS, SPEED SCHEDULES

LOW temperatures retard the hardening of concrete—it must be protected against freezing and heat-cured until service strong. This graph shows the effect of cold weather on 28-day strengths of concrete cured at 70°—ONE DAY FOR 'INCOR'... 1 and 3 days for Lone Star Cement—and then exposed to winter temperatures.

'Incor' concrete, heat-cured one day, produces 28-day strengths 25% to 30% greater than Lone Star Cement concrete heat-cured 3 days. 'Incor' makes concrete safe for winter work... reduces freezing risk... saves at least 2 days' heat-curing on each pour... speeds job schedules. Save time, money, worry... keep job speed up and job costs down... use 'Incor'* 24-Hour Cement on cold-weather work.

Continuous research in Lone Star Cement Research Laboratories provides valuable performance data. We shall be glad to furnish specific information on request. *Reg. U. S. Pat. Off.

LONE STAR CEMENT CORPORATION

Offices: ALBANY • BIRMINGHAM • BOSTON • CHICAGO • DALLAS • HOUSTON • INDIANAPOLIS • JACKSON, MISS.
KANSAS CITY, MO. • NEW ORLEANS • NEW YORK • NORFOLK • PHILADELPHIA • ST. LOUIS • WASHINGTON, D. C.

LONE STAR CEMENT, WITH ITS SUBSIDIARIES, IS ONE OF THE WORLD'S LARGEST CEMENT PRODUCERS. 15 MODERN MILLS, 25-MILLION BARRELS ANNUAL CAPACITY

MATERIALS AND LABOR PRICES

Market quotations on construction materials and wage rates reported monthly by ENR correspondents

CONSTRUCTION MATERIAL PRICES for October reveal only minor changes from a month ago in the twenty cities reporting to *Engineering News-Record*.

Short-leaf yellow pine is $3.00 per M ft. higher on 2-in. sizes in Chicago, and 1x8-in. boards are up $4.00 in St. Louis. These are the only changes from October lumber price levels.

Common brick is up 50c. per M in both Kansas City and New York. In the latter city the increase is due to the discontinuation of dealer discounts.

Reinforcing bar prices are 1c. higher in Atlanta, and the structural steel shape price is up 19c. per 100-lb. in Kansas City. Sand, gravel and crushed stone are 25c. lower in Detroit.

Concrete block prices increased in Atlanta and Boston, and ready-mixed concrete is up 25c. per cubic yard in Minneapolis.

Skilled and common construction labor rates in all the cities remain unchanged from the preceding month.

CEMENT, AGGREGATES, READY-MIXED CONCRETE—F.O.B. CITY

	PORTLAND CEMENT (Per bbl., C/L lots, incl. 40c. per bbl. for bags, cash dis. not deducted)			SAND AND GRAVEL (Per ton, carload lots)			CRUSHED STONE (Per ton, carload lots)		CRUSHED SLAG (Per ton, carload lots, f.o.b. plant)		CONCRETE BLOCK 8x8x16-in.; truckload del.; per block		CONCRETE Ready Mixed 1:2:4, over 50 c.y., del.
	Cloth *a*	Paper	Bulk	Gravel, 1½ in.	Gravel ¾ in.	Sand	1½ in.	¾ in.	1½ in.	¾ in.	Sand-grav.	Lt. wgt. Agg.	
Atlanta	$2.77	$2.52	$2.47	$1.79	$1.89	$1.99	$1.79	$1.89	$1.59	$1.69	$0.17	.....	$8.00
Baltimore	2.33	2.08	1.88	1.75‡	1.75‡	1.25‡	1.75‡	1.75‡	1.75‡	1.75‡	.125	$0.125*w*	7.25
Birmingham	2.50	2.25	2.10	1.75	1.75	1.50	.85	1.00	.90	1.15	.1425	....	5.80
Boston	2.75*b*	2.40*b*	2.30	1.40‡	1.40‡	1.00‡	1.40‡	1.40‡	....	....	.135	.135*w*	7.25*m*
Chicago	2.70	2.45	2.30	2.15‡*d*	2.15‡*d*	2.15‡*d*	2.15‡*d*	2.15‡*d*	1.75‡	1.75‡	.16	.16*x*	....
Cincinnati	2.31	2.06	1.81	1.20	1.20	1.10	1.80	1.80	....	....	.12	.15*w*	6.60
Cleveland	2.40	2.15	....	1.70*i*	1.70*i*	1.60*i*	1.70*i*	1.70*i*	1.75*i*	1.75*i*	.14	.14	7.30*k*
Dallas	2.52	2.27	2.07	1.50*p*	1.70*p*	1.10*p*	1.69*p*	1.79*p*	....	....	.15	....	6.20
Denver	3.08	2.88	2.32	1.20	1.30	1.25	1.65	1.75	1.00	1.00	.15	.15*w*	7.25
Detroit	2.39	2.14	1.99	2.00	2.00	1.75	2.00	2.00	2.00‡	2.25‡	.16	.18*w*	6.50
Kansas City	2.58	2.33	2.18	1.85	2.30	1.00	1.91	1.91	....	....	.125	.125*wy*	7.50*n*
Los Angeles	2.80*v*	2.20*v*	....	1.30	1.30	1.15	1.30*f*	1.30*f*	....	....	.045*bb*	.10*aa*	7.25
Minneapolis	2.90	2.65	....	1.00*h*	1.00*h*	.25*h*	1.00*h*	1.00*h*	....	....	.12	.16	7.35*j*
Montreal	....	1.95*r*	1.79*r*	....	1.65‡*t*	2.05‡*t*	1.05‡*t*	1.15‡*t*	....	....	.14*c*	.14*wc*	7.90*k*
New Orleans	2.41	2.16	1.96	1.65	1.65	.90	....	....	....	....	.19	....	9.25
New York	2.69‡	2.44‡	....	1.60*de*	1.60*de*	.90*de*	1.70*de*	1.80*de*	....	....	.14*cc*	.14*wcc*	7.50*k*
Philadelphia	2.33	2.08	1.88	1.55‡	1.65‡	1.20‡	1.90	1.95	1.10	1.10	.155	.155*w*	8.20
Pittsburgh	2.45	2.20	2.00	1.65‡	1.65‡	1.85‡	2.25‡	2.25‡	1.50	1.50	.17	.17*z*	8.25
St. Louis	2.80	2.52	....	1.75‡	1.50‡	1 25/1.50‡	1.10*h*	1.10*h*	.75*g*	.75*g*	.125	.165*w*	8.00
San Francisco	....*u*	2.21	1.91	1.36	1.36	1.36	1.46	1.46	....	....	....	.20*aa*	7.55
Seattle	2.95*o*	2.75*o*	....	1.00*o*	1.00*o*	1.00*o*	2.00*o*	2.00*o*	....	....	.16	.16*y*	7.25

‡ Delivered. *a* 10c. allowed for each returnable bag. *b* 10c. per bbl. off for cash. *c* Plus municipal tax. *d* Per cu. yd. *e* Barge lots alongside docks. *f* Crushed granite. *g* F.o.b. Granite City, Ill. *h* F.o.b. plant. *i* Within three miles of Public Square. *j* 5% discount for cash. *k* Discount of 2 percent for cash in 10 days. *l* Up to 200 cu. yd. *m* 50c. off for cash. *n* 25 c.y. or more. *o* 2% off for cash. *p* 10c. per ton off, cash 15 days. *r* 10c. per bbl. off, cash 20 days. *s* 8% sales tax included. *t* 8% sales tax not included. *u* Price withdrawn. *v* 20c. per bbl. discount; 20c. allowed for returnable cloth bag. *w* Cinder. *x* Waylite. *y* Haydite. *z* Celocrete. *aa* Pumice. *bb* 4 x 8 x 12 in. *cc* Also 8 x 18 x 18 in.

CASH DISCOUNTS CEMENT to Contractors: truck delivery, 2% for cash on 10th of month; on carload deliveries, no trucking, same as dealer cash discount 10c. per bbl. for payment within 15 days of date of invoice. Subject discount 10c. per bbl. 20 days in Montreal.

CURRENT MAXIMUM PRICES RECEIVED AT CEMENT MILL

Charge for bags not included. For cloth bags, add 40c. per bbl.; 10c. refund allowed for each returnable bag; for paper bags add 15c. per bbl., not refundable

	Bagged	Bulk		Bagged	Bulk		Bagged	Bulk
Buffington, Ind	$1.70	$1.65	Ironton, Ohio	$1.60	$1.55	Richard City, Tenn	$1.80	$1.75
Dallas, Tex. (Inc. 9c. tax)	1.84	1.79	Limedale, Ind	1.70	1.65	Steelton, Minn	1.80	1.75
Hannibal, Mo	1.70	1.65	Norfolk, Va	1.75	1.70	Universal, Pa	1.65	1.60
Hudson, N. Y	1.75	1.70	Northampton, Pa	1.55	1.50	Waco, Tex. (Plus 9c. tax in Tex.)	1.75	1.70
Independence, Kans	1.70	1.65	North Birmingham, Ala	1.70	1.65	Montreal (8% sales tax incl.) Discount 10c. per bbl. 20 days	1.68	1.67

PAVING BRICK, BLOCK, ASPHALT, ROAD OILS—F.O.B. CITY

	PAVING BRICK AND BLOCK: Granite per M. lots of 50,000 4x4x8 in.	Brick per M 3x4x8½ in. carload lots	Wood per sq. yd. 3½ in. 16-lb. treat	PAVING ASPHALT (Per ton, less than 80 penetration): Tank car	Drums	ASPHALT BINDERS—FLUXES (Per gal., 80–300 penetration): Tank car	Drums	CUTBACK ASPHALT (Per ton): Tank car	Drums	ROAD OIL (Per gal.): Tank car	ASPHALT EMULSION (Quick-breaking) (Per gal.): Tank car	Drums
Atlanta	$73.00	$39.35	$2.25	$18.53*e*	$24.62*e*	$0.0740*e*	$0.1309*e*	$0.0802*he*	$0.1348*h*	$0.0676*e*	$0.0826	$0.1384
Baltimore	150.00‡	48.00	80.00*m*	15.00*r*	21.00*r*	.06*r*	.09*r*	13.00*r*	23.00*r*	.065*r*	.07*r*	.14*r*
Birmingham	150.00	48.00	.....	17.95	.....†	.0747	.....†	.0834*h*	.....†	.065	.09	.....†
Boston	80.00	57.00	3.75	14.20	20.00	.06	.09	.065*h*	.115*h*	.065	.09‡	.122
Chicago	150.00	55.00	1.80/2.00*d*	14.00	22.50	13.00*g*	21.50*g*	.0575*h*	.15*h*	.05*n*	.09/10*n*	.13/.15*n*
Cincinnati	120.00	50.00	.....	16.40	.....	.085	.....	12.25	.....	.07	.085	.....
Cleveland	118.00	37.50	2.25	19.00	20.00	.09	.105	.10*h*	.15	.105	.09	.095
Dallas	.....	36.00	.....	13.65	20.30	.06	.11	16.00	24.80	.06	.05/.07	.07/.09
Denver	.....	66.11	.....	11.00	.....	10.00	.....	.045*h*	.....	.....	.....	.....
Detroit	.....	37.50	.....	18.06*f*	25.60*f*	.0743	.128	.0718*h*	.119*h*	.067	.0755	.1149
Kansas City	.....	40.00	.....	18.50	23.50	.077	.1075	.077*h*	.107*h*	.057	.11	.15
Los Angeles	.....	50.00	.....	9.00*b*	23.00	9.50*bg*	24.00*bg*	9.50*b*	.....	.025	.072	.15
Minneapolis	.....	.....	2.30*d*	.....	27.70	.....	.126	.....	32.64	.....	.....	.....
Montreal	.....	.....	.....	16.60*k*	24.25*k*	.116*k*	.1485*k*	.115*hk*	.135*hk*	.08*k*	.135*k*	.188*k*
New Orleans	.....	.....	.....	13.50*a*	20.00*a*	.057	.088	.06*h*	.095*h*	.....	.080	.....
New York	.....	70.00	.....	17.40	24.20*p*	14.00	.....	.0725*h*	.1325*hp*	.....	.0725*p*	.1225*p*
Philadelphia	140.00	58.00	4.06	15.00*r*	.....	14.00*r*	.....	.065*hr*	.....	.....	14.00*r*	.....
Pittsburgh	135.00	38.75	.....	18.00	23.00	.09	.16	20.00	36.00	.07	.06	.11
St. Louis	.....	37.00	.....	16.00	22.00	15.00*g*	21.00*g*	.0575*h*	.1213*h*	.648	.0525	.1125
San Francisco	.....	40.00	.....	10.90	21.15	10.90*gr*	18.00*gr*	12.90	17.50*r*	9.50*gr*	.0525	.1125
Seattle	.....	60.00*c*	.....	10.90*i*	19.40*i*	.....	20.40*gi*	11.40*i*	.....	10.90*i*	.0525*i*	.0625*i*

‡ Delivered. *a* F.o.b. Baton Rouge. *b* Delivered to purchaser's warehouse. *c* 3½x4x8½ in. *d* 2½ in. 12-lb. treatment. *e* Local reduction due to 20% reduction intra-state class freight rates, only Georgia affected. *f* Mexican. *g* Per ton. *h* Per gallon. *i* F.o.b. Martinez. *j* 3x3½x8½ in. *k* Tax included. *m* Per thousand. † Available on priority only and quoted specially. *n* No steel drum shipments except to armed forces. *r* February 1943 prices, none later available

OHIO PUBLIC SERVICE CO. GENERATING STATION
Dilles Bottom, Ohio

Behind the "Lines" . . .

BEHIND many of the transmission lines supplying Canadian and American industry with vital electricity are great power plants and concrete dams built with POZZOLITH (Cement Dispersion).

Like the electric power, which it has oftentimes helped make available in record time, Pozzolith produces definite, measurable results. In addition to speeding construction, Pozzolith reduces costs . . . produces greater concrete durability.

The following power plants and dams are part of the list of hundreds of projects built with Pozzolith during the past 11 years:

ALLARD DAM.....Disraeli, Quebec
ANDERSON CREEK DAM.....Dubois, Penna.
AVON RIVER POWER CO. DAM.....Wolfville, N. S.
BOSTON EDISON CO. POWER HOUSE.....Boston, Mass.
CLEVELAND ELECTRIC ILLUMINATING CO. POWER PLANTS
(3 Power Plants and 10 sub stations in Ohio)
DUKE POWER CO. SPILLWAY.....Bridgewater, N. C.
EMPIRE DISTRICT ELECTRIC CO.
WHITE RIVER DAM.....Ozark Beach, Mo.
FORT PECK DAM POWER PLANT.....Fort Peck, Montana.
GRAND RIVER DAM.....Vinita, Okla.
HARRISBURG DAM.....Dauphin, Penna.
INDIANAPOLIS POWER & LIGHT CO.
HARDING ST. STATION POWER PLANT....Indianapolis, Ind.
INTERNATIONAL HYDRO-ELECTRIC CORP.
SHERMAN ISLAND MILL DAM.....Glens Falls, N. Y.
METROPOLITAN EDISON COMPANY DAM..York Haven, Penna.
MITCHINAMEKUS MAIN DAM OF
MAC LAREN QUEBEC POWER CO.....Mont Laurier, Quebec
NEW YORK STATE GAS & ELECTRIC CO.
COLLIER'S DAM.....Oneonta, N. Y.
OHIO PUBLIC SERVICE CO. GENERATING STATION
.....Dilles Bottom, Ohio
OTTAWA SILICA CO. POWER PLANT.....Ottawa, Ills.
PARKCHESTER POWER HOUSE.....Parkchester, Bronx, N. Y.
POTOMAC-EDISON CO. POWER PLANT.....Cumberland, Md.
RAINBOW DAM.....Lake Tomahawk, Wisconsin
SHIPSHAW POWER DAM.....Racine, Quebec
SOUTHERN INDIANA GAS & ELECTRIC CO.
OHIO RIVER STATION POWER HOUSE.....Evansville, Ind.
TENNESSEE VALLEY AUTHORITY
SOUTH HOLSTON TUNNEL.....Bristol, Tenn.
WESTINGHOUSE ELECTRIC CO.
DAM & PUMPING STATION.....Pittsburgh, Penna.

Whatever your concrete requirements, Pozzolith — Cement Dispersion *— will improve the results. Wire or write for complete information or demonstration.

THE MASTER BUILDERS COMPANY, LTD.

TORONTO In the U. S. A.: The Master Builders Company, Cleveland, Ohio **MONTREAL**

**Other Master Builders Products employing Cement Dispersion which are serving the Construction Industry to produce faster, better, more economical results: MASTERPLATE for heavy duty floors; EMBECO for non-shrink concrete grouts and repairs; OMICRON MORTARPROOFING for masonry mortars*

MASTER BUILDERS

IRON AND STEEL PRODUCTS—BASE MILL PRICES

	STRUCT. SHAPES-PLATE	REINF. BARS ¼-in billet *b*	RIVETS ½-in. structural	WIRE NAILS Base *d*	SHEET PILING Base	STEEL RAILS Per Gross Ton Standard	Light	Re-rolled	Angle Bars	TRACK SUPPLIES Std. Spikes *c*	Tie Plates *c*	Track Bolts
Birmingham	$2.10	$2.15	$3.75	$2.55	.....	$40.00	$40.00	$39.00	$2.70	$3.00	$2.15	$4.75
Chicago	2.10	2.15	3.75	2.55	$2.40	40.00	40.00	39.00	2.70	3.00	2.15	4.75
Pittsburgh	2.10	2.15	3.75	2.55	2.40	40.00	40.00	39.00	2.70	3.00	2.15	4.75
Buffalo	2.10	2.15	.....	.....	2.40	.....	.....	.....	.....	.....	2.15	.....
Cleveland	2.10	2.15	3.75	2.55	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown	.....	2.15	.....	.....	.....	.....	.....	.....	.....	3.00	.....	.....
Detroit	.....	2.27‡	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gulf ports	2.47*a*	2.52*a*	.....	.....	2.85*a*	.....	.....	.....	.....	.....	.....	.....
Pacific ports	2.75*a*	2.80*a*	.....	3.05	2.95*a*	.....	.....	.....	.....	.....	2.30	.....

‡ Delivered. *a* F.o.b. cars dock. *b* Rail steel same as billet prices. *c* Other basing points include Portamouth, O., Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., and Pacific coast ports, on tie plates alone, Steelton, Pa., on spikes alone, Lebanon, Pa., Richmond, Va. *d* Add switching charge $18 per c.l.

IRON AND STEEL PRODUCTS—F.O.B. WAREHOUSE, PER 100 LB., BASE PRICE

	STRUCTURAL SHAPES Per 100 lb. base price	REINFORCING BARS* Per 100 lb., ¼ in., base price 15 tons or over *b* New billet	Rail steel	Add Switch	$/cwt. for Del.	EXPANDED METAL LATH Per 100 sq.yd., carload lots Std. diamond mesh, 3.4 lb	Std. ribbed 3.4 lb.	WELDED FABRIC REINFORCING Per 100 sq.yd., carload lots 4x16 in., No. 5 & 10 wires	4x12 in., No. 8 & 12 wires	6x6 in. No. 6 - 6 wires Per sq. yd	SHEET PILING Per 100 lb. base price
Atlanta	$2.34	$2.40	$2.40	$.02½	$.10	$21.06	$23.00	$1.82	$1.35	$0.1719	$3.04
Baltimore	3.70	2.90	2.75	.....	.10	22.50	24.50	1.70	1.27	.1611	3.00
Birmingham	2.10*a*	2.15	2.15	.02½	.10	19.00	21.00	1.80	1.34	.1701	.....
Boston	3.85	3.51	3.36	$20 C.L.	.10	18.50	29.50	1.76	1.31	.1656	2.70
Chicago	2.10*a*	2.15	2.15	.03	.05	21.50	23.50	1.67	1.25	.1575	2.40
Cincinnati	3.68	2.53*cd*	2.53*c*	.....	.05	19.50	21.50	1.66	1.25	.1566	.....
Cleveland	2.10*a*	2.15	2.15	.02½	.10	19.50	21.50	1.66	1.25	.1566	.....
Dallas	4.25	3.17	3.17	.....	....	25.00	27.50	1.93	1.42	.1827	.....
Denver	4.57	4.842	3.85	.....	....	26.50	26.50	1.97	1.45	.186	.....
Detroit	3.65‡	2.52‡	2.52‡	.....	.10	30.00	30.00	1.68	1.26	.1584	2.66
Kansas City	4.19	2.61*cd*	2.61*cd*	.0	.05	24.50	26.50	1.78	1.33	.1683	2.874
Los Angeles	3.65*f*	2.575	2.425	.02½	.05	23.00	27.50	1.93	1.42	.1827	3.65
Minneapolis	3.81‡	2.73	2.73	.0	.10	25.00	27.00	1.80	1.34	.1701	2.73*d*
Montreal	4.00*i*	2.90*i*	2.80*i*	.....	....	26.00*hij*	33.00*hij*	2.56*i*	3.14*i*	.2684	.....
New Orleans	4.40	2.52	2.52	.05	.10	21.50	23.50	1.82	1.35	.1715	2.875
New York	3.75	2.76*e*	2.76*e*	.....	.15	17.50	19.50	1.76	1.32	.1665	2.74
Philadelphia	3.66	3.82	....	.....	....	19.50	21.50	1.71	1.28	.1611	2.72
Pittsburgh	2.10*a*	2.15	2.15	.02½	.10	23.00	26.50	1.59	1.20	.1503	2.40
St. Louis	3.697	2.74	2.74	.0	.05	28.00	34.00	1.69	1.27	.1602	2.70
San Francisco	4.35	2.825	....	.02½	.10	21.00	24.50	1.93	1.42	.1827	3.85
Seattle	2.75*e*	2.80*e*	....	.....	....	34.50	38.50	1.93	1.42	.1827	2.95*d*

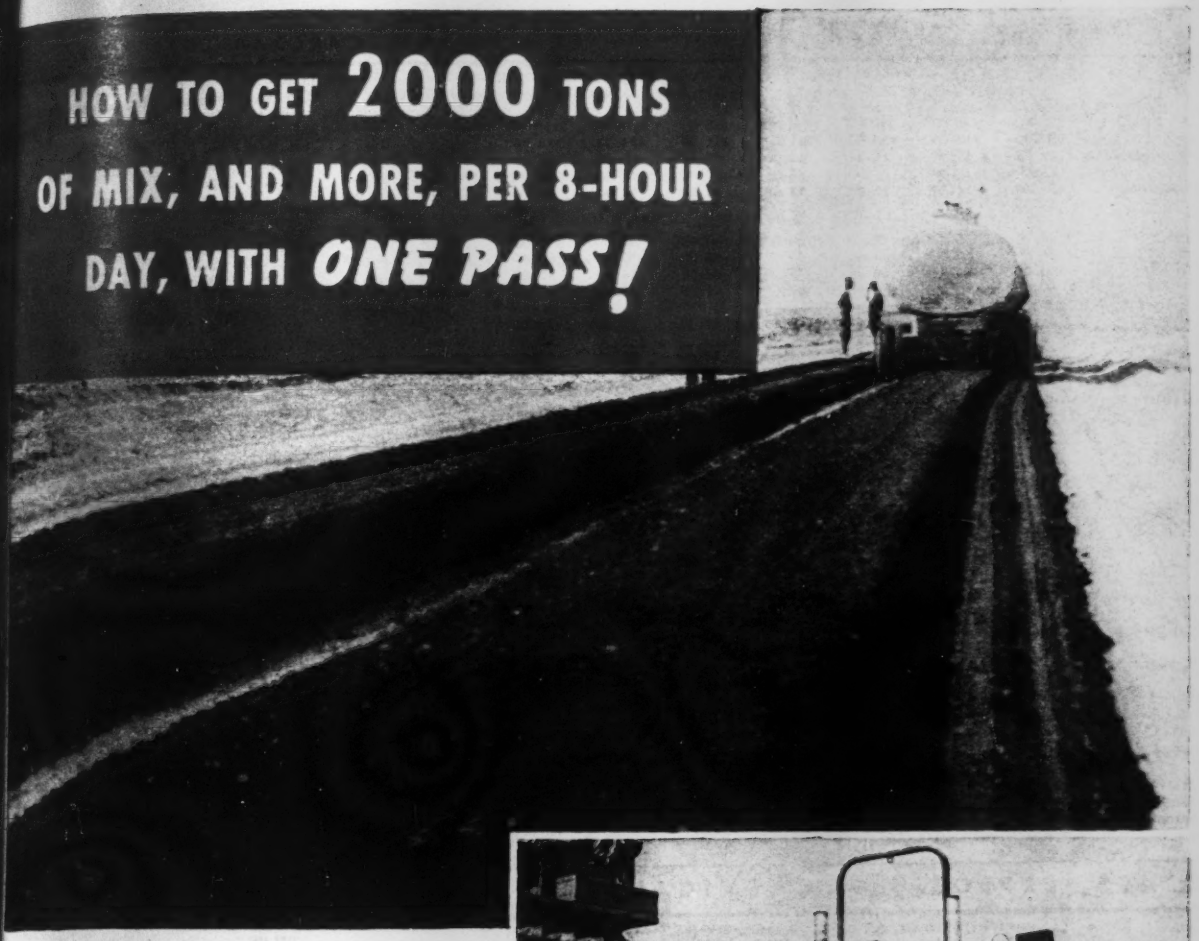
‡ Delivered. *a* Mill prices. *b* 5–15 tons, add 15c. 1–5 tons, add 25c. Less than 1 ton, add 50c. *c* 20 tons or over Base. *d* Mill price plus freight. *e* F.o.b. dock. *f* Includes delivery in free delivery zone. *g* Less than 1 ton, add 25c.; 1 to 5 tons, add 10c. * High scrap steel prices cut former 15c. differences between new billet and rail steel in many mills. *h* List price. *i* Plus Dominion and Province sales tax. *j* August 1942 price; not on market.

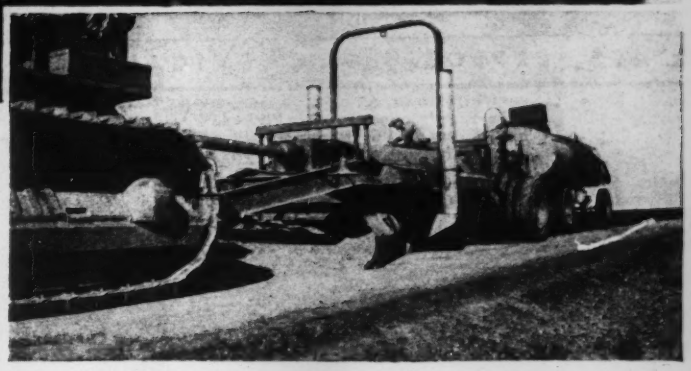
PLUMBING, HEATING, WATER, SEWER AND DRAIN PIPE

	C. I. PIPE Per net ton f.o.b. 6 in. to 24 in.*a*	VITRIFIED SEWER PIPE Per foot, std. 8 in., s.s.	Delivered std. 12 in., s.s.	ASTM 24 in.,	C13–35 36 in.,	CLAY DRAIN TILE Per 1,000 ft., carload lots, f.o.b. 6 in.	8 in.	CONCRETE SEWER PIPE Per ft., delivered; ASTM 12 in.	C 14–35 24 in.	WROUGHT STEEL PIPE Full standard weight, *h* 1 to 3 in., Black %	Galv. %	Butt Weld 3½ to 6 in.: Black %	Lap Weld Galv. %
Atlanta	$49.66	$0.265	$0.468*bc*	$1.8525	$4.68*c*	$85.00	$128.00	$0.45	$1.642	48.2	54.2	59.7	51.2
Baltimore	53.00	.35	.60	2.65	7.25	160.00	200.00	.50	1.75	65.5	57.5	63.0	54.5
Birmingham	45.00	.275	.495	1.95	5.50	100.00	220.00	.50	1.70	62.2	54.2	59.7	51.2
Boston	55.40	.26	.463	2.07	5.85	140.00	.....	.60	.....	....	....	....	....
Chicago	54.33	.35	.675	2.70	7.00	100.00‡	150.00‡	.45	1.85	66.0	55.0	64.5	53.0
Cincinnati	53.27	.231	.4455	1.80	5.125	105.00	170.00	.60	1.70	57.1	43.4	54.0	39.6
Cleveland	54.75	.196	.378	1.62	4.715	81.00	125.00	.30	1.60	68.5	57.5	66.0	54.5
Dallas	56.43	.31	.58	2.25	5.00	90.00	110.00	.46	1.57	59.9	51.9	57.3	48.3
Denver	61.56	.29†	.52†	2.16†	3.00*n*	125.00	200.00	1.00	2.22	58.4	50.4	55.7	47.2
Detroit	54.75	.35	.675	2.70	7.75	125.00	180.00	.40	1.75	57.7	44.0	54.8	40.6
Kansas City	55.73	.315	.39	2.20	5.86	140.00	260.00	.45	1.60	35.6	46.1	46.2	39.4
Los Angeles	68.40	.282†	.508†	2.034†	5.085†	115.50	192.50	1.00	2.00	61.1	50.1	58.6	47.1
Minneapolis	59.00	.275†	.495†	1.98†	5.37†	.....	.....	.90	2.10	64.2	53.2	60.7	49.2
Montreal	60.00	.85*o*	1.50*o*	5.25*p*	8.50*ep*	45.00*m*	64.00*m*	.48*m*†	1.92*m*†	....	....	....	....
New Orleans	51.78	.26	.48	1.69	.....	150.00	220.00	.45	1.65	62.4	54.4	58.8	50.3
New York	52.40	.322	.621	2.61	6.65	.....	.....	.60	1.40	64.9	53.9	62.4	50.9
Philadelphia	51.00	.30	.58	2.50	7.50	150.00	225.00	.45	1.75	56.6	42.8	53.6	39.1
Pittsburgh	56.00	.245†	.4725†	1.845†	5.4325	97.80	154.20	.85*g*	2.00*g*	68.5*i*	57.5*i*	66.0*i*	54.5*i*
St. Louis	52.84	.28	.504	2.016	4.50	85.00	220.00	1.00*j*	2.15*k*	56.4	42.6	52.5	38.4
San Francisco	68.40	.3625*d*	.6525*d*	2.61	6.52	115.00	192.50	.58	2.34	45.0	31.0	41.0	28.0
Seattle	70.20	.375	.675	2.70	6.75	84.00	187.50	.51*f*	1.44*f*	....	....	....	.....

‡ Delivered. †F.o.b. *a* B. & S. class B and heavier, C/L lots, 200 tons and over Burlington, N.J. (base) $49.00. Based on existing freight rates; subject to rate change. Gas pipe and class A, $3 per ton additional, 4 in., $3 per ton additional, 30 in. and larger usually $2 per ton less. *b* Double strength. *c* List to dealer. *d* List. *e* 30-inch. *f* Less 5% for cash. *g* Culvert pipe. *h* Discounts from standard list consumers carload prices, except Pittsburgh prices are f.o.b. mill. Base price $200 per net ton. List prices per ft.; ¼ in., 8½c.; ⅜ in., 11½c.; 1 in., 17c.; 2 in., 37c.; 2½ in., 58½c.; 3 in., 76½c.; 4 in., $1.09; 6 in., $1.92. 3 percent tax on transporation costs not included. *i* Applies also at Lorain, Ohio, mills. Chicago delivered base is 2½ points less on butt, 1½ on lap. Freight is figured from Pittsburgh, Lorain, O., Chicago Dist. Billing is from point producing lowest price at destination. WROUGHT IRON PIPE: Base price and list prices per ft. same as wrought steel pipe. Discount for Pittsburgh base: Butt-weld—1 in. and 1¼ in. black 34, galv. 16; 1½ in. black 38, galv. 18½; 2 in. black 37½, galv. 18. Lapweld—2½ in. to 3½ in. black 31½, galv. 14½; 4½ in. to 8 in. black, 32½ galv. 17. *j* Reinforced; spec. C 76–37. *k* Reinforced; spec. C 75–37. *l* Plus sales tax. *m* Tax included. *n* 27-in. pipe. *o* Less 50%. *p* Less 53%.

HOW TO GET 2000 TONS OF MIX, AND MORE, PER 8-HOUR DAY, WITH *ONE PASS!*





-use WOOD ROAD-MIX methods of pavement construction —

The formula is as simple as A-B-C. Grade the surface to be paved, windrow materials into equalized windrows, make ONE PASS with a Wood Roadmixer, then spread and compact.

Whether the job calls for emulsions, road-oils or soil-cement the Wood Roadmixer handles them all in ONE PASS and, if conditions are better than average, will deliver far in excess of 2000 tons per 8-hour day.

Synchronized travel speed and mixing action, plus accurate binder volume control, is the answer. But there are plenty of other reasons why this pioneer travel plant is the world's leading, yet most inexpensive, mix-in-place method of pavement construction.

A completely illustrated and descriptive bulletin gives all the facts. Write for it.

Dealerships for this popular roadbuilding equipment are now available to qualified dealers. . . . Write for particulars.

➡ ➡ ➡ DESIGN FOR ROAD-MIX

WOOD ROADMIXER

LUMBER, TIMBER PLYWOOD—PER M FT., B.M., CARLOAD LOTS F.O.B.

	SHORT LEAF YELLOW PINE AND DOUGLAS FIR — All S. L. Y. P. is No. 2 common or better and for No. 1 N. C. Box. (Prices in Bold Face) — *All Fir planks No. 2 common, Fir timber is No. 1 common. Lengths up to 20 ft. (Prices in italics)*									LONG LEAF Y. P. Merchantable grade up to 20 ft.		PLYWOOD Rail freight increment (See note for base prices)	
	1x6 S4S	1x8 S4S	2x4 S4S	2x6 S4S	2x8 S4S	2x10 S4S	3x12 Rgh	6x12 Rgh	12x12 Rgh	2x12 Rgh	12x12 Rgh	¾"	¾"
Atlanta	**$37.00**	**$37.00**	**$32.00**	**$31.00**	**$31.00**	**$34.50**	**$49.00**	.....	.....	$58.00	$66.00	$17.90	$21.65
Baltimore	**42.00**	**45.00**	**42.00**	**42.00**	**43.00**	**48.00**	**55.00**	.....	.....	115.00	120.00	18.25	22.25
	48.00	*48.00*	*55.00*	*55.00*	*55.00*	*55.00*	*68.00*	*$70.00*	*$70.00*	.....	.....		
Birmingham	**34.50**	**36.50**	**32.00**	**32.00**	**34.00**	**34.00**	**53.00**	**53.00**	**56.00**	.....	.....	17.35	21.15
[1]	37.50	37.50	37.00	37.00	37.00	43.00	65.00	.....	.....	67.50	70.00	.....	.....
Boston ‡*	**42.00**[3]	**45.00**[3]	**55.00**[3]	**60.00**[3]	**60.00**[3]	**65.00**[3]	**75.00**[3]	.....	.....	**85.00**[3]	.....	18.25	22.25
‡*	*50.00*	*50.00*	*55.00*	*60.00*	*65.00*	*70.00*	*80.00*	*85.00*	*85.00*	.....	.....	.....	.....
Chicago	**50.00**	**51.00**	**50.00**	**49.00**	**50.00**	**54.00**	**67.00**	.....	.....	**80.00**[3]	**95.00**[3]	14.60	17.80
	50.00	*50.00*	*47.50*	*47.00*	*47.00*	*48.00*	*57.00*	*66.00*	*68.00*	.....	.....	.....	.....
Cincinnati	**41.00**	**42.50**	**39.00**	**40.50**	**42.00**	**43.00**	**53.00**	.....	.....	65.00	68.00	17.35	21.15
	.....	.....	.....	.....	.....	.....	*55.50*	*55.50*	*55.50*	.....	.....	.....	.....
Cleveland	**42.50**[h]	**42.50**[h]	**52.50**[h]	**51.00**[h]	**65.00**	**68.00**	**83.00**	**83.00**	**83.00**	.....	.....	17.75	21.60
Dallas .....[e]	**41.50**	**42.50**	**38.50**	**37.50**	**37.50**	**38.50**	**53.50**	**53.00**	**53.00**	**78.00**	**83.00**	14.60	17.80
Denver .....‡	**64.00**[4]	**62.00**[4]	**65.00**[4]	**65.00**[4]	**65.00**[4]	**66.00**[4]	**69.00**[4]	*83.00*	*89.00*	.....	.....	10.45	12.70
Detroit	**61.00**	**61.00**	**57.75**	**57.75**	**57.75**	**62.75**	**72.75**	.....	.....	70.75	78.00	17.35	21.15
	.....	.....	.....	.....	.....	*63.75*	*71.00*	*75.00*	*75.00*	.....	.....	.....	.....
Kansas City .. *a*	**64.00**	**64.00**	**62.00**	**60.50**	**62.00**	**64.00**	**79.00**	.....	.....	79.00	89.00	12.60	15.40
	60.00	*60.00*	*58.00*	*58.00*	*58.00*	*58.00*	*75.00*	*80.00*	*80.00*	.....	.....	.....	.....
Los Angeles ....*a*	*58.50*	*58.50*	*58.50*	*59.00*	*60.25*	*60.25*	*75.75*	*74.25*	*74.25*	.....	.....	9.90[gh]	12.05[gh]
Minneapolis ....‡*b*	**59.00**[3]	**59.00**[3]	.....	.....	.....	.....	.....	.....	.....	.....	.....	12.60	15.40
‡	*55.50*	*55.50*	*54.25*	*54.50*	*53.50*	*54.75*	*64.75*	*63.50*	*63.50*	.....	.....	.....	.....
Montreal .....†[7]	**52.00**	**55.00**	**48.00**	**52.00**	**54.00**	**60.00**	.....	.....	.....	**200.00**	**200.00**	.....	.....
	42.50	*42.50*	*45.25*	*45.25*	*45.25*	*46.75*	*50.00*	*50.00*	*50.00*	.....	.....	.....	.....
New Orleans ...	**37.50**	**37.50**	**32.50**	**31.50**	**31.50**	**35.00**	**46.00**	.....	.....	52.50	69.00	14.60	17.80
	31.00	*31.00*	*33.00*	*31.00*	*34.00*	*32.00*	*33.00*	.....	.....	.....	.....	.....	.....
New York	**60.50**	**61.50**	**56.25**	**55.25**	**56.25**	**59.50**	**67.50**	.....	.....	**120.00***f*	**125.00***f*	18.35	22.25
‡	.....	.....	*65.00*[i]	*65.00*[i]	*65.00*[i]	*65.00*[i]	[Range from $75 to $95]			.....	.....	.....	.....
Philadelphia ...	**65.00**	**63.00**	**62.00**	**61.00**	**61.00**	**64.00**	**84.00**	.....	.....	**126.00**	**122.00**	18.25	22.25
	[*$70.00 to $85.00*]		*75.00*	*75.00*	*75.00*	*75.00*	*77.50*	*$85 to $105*	*$85 to $105*	.....	.....	.....	.....
Pittsburgh	**50.80**	**53.20**	**62.75**	**55.00**	**60.85**	**62.50**	**76.25**	.....	.....	.....	.....	18.10	22.05
	69.20	*68.10*	*66.10*	*65.30*	*65.20*	*65.65*	*88.75*	*88.75*	*88.75*	.....	.....	.....	.....
St. Louis .....‡*c*	**56.00**	**56.00**	**53.00**	**52.00**	**53.00**	**56.00**	**69.00**	*75.00*	*75.00*	**86.00**	**85.00**	14.60	17.80
San Francisco ..*d*	*36.00*	*36.00*	*34.00*	*34.00*	*33.25*	*33.25*	*39.00*	*38.25*	*38.75*	.....	.....	7.30*g*	8.90*g*
Seattle	*35.00*	*35.00*	*35.00*	*35.00*	*35.00*	*35.00*	*40.00*	*40.00*	*40.00*	.....	.....	0.00	0.00

Bold Face type, Southern Pine. *Italics, Douglas Fir.* [1] Long leaf. [2] Roofers' N. C. Pine. [3] Spruce. [4] Native. [5] Western Pine, No. 3 Common. [7] Spruce. [8] Norway Pine. ‡ Delivered. *a* Yard prices. *b* Contractors discount in Minneapolis and St. Paul discontinued May 21, 1938. *c* 5M ft. or less. *d* F.o.b. cars San Francisco freight rate. *e* 10% discount taken off. *f* Up to 18 ft. † Plus sales tax. * Prices for truck delivery; no longer quoting carload lots f. o. b. city.

Note: Special concrete form grade Fir Plywood, 4' by 8' panels, 5-ply, sanded 2 sides, water resistant glue, carload lots, delivered per 1,000 sq. ft. surface. Seattle base price on ¾", $95.15; on ¾", $104.85; price includes oiling and sealing charges. For other centers add rail freight increment from table or proper size. For resin dipped treatment, add $10.50 per M. *g* Lower rate by water shipment. *h* 50,000 lb. minimum. *i* Ranges from $65 to $69. *j* Average price. *k* August price. *l* September price; none later available.

GLASS, EXPLOSIVES, CHEMICALS

	WINDOW GLASS — Discounts from jobbers list, Aug. 15, 1938 Single or Double Thickness A quality	B quality	EXPLOSIVES — Per lb. 40% Ammonia Gelatin in 50-lb. cases delivered in 200 lb. lots*	
Atlanta	75%	75%	$0.15	
Baltimore	78%	79%	.15	
Birmingham	76%	76%	.105	
Boston	77%	78%	.15	
Chicago	77%	77%	.15	
Cincinnati	77–10%	77–10%	.15	
Cleveland	77–10%	77–10%	.19	
Dallas	76%	76%	.1625	
Denver	76%	76%	.155*e*	
Detroit	77%	77%	.1575	
Kansas City	77–10%	77–10%	.155	
Los Angeles	86%*d*	88%*d*	.1575	
Minneapolis	77%	77%	.155	
Montreal	40–5%‡	47%‡	.1675†	
New Orleans	70%	75%	.16	
New York	81%	82%	.22*f*	
Philadelphia	78%	79%	.15	
Pittsburgh	79%	79%	.1225	
St. Louis	77–10%	77–10%	.155	
San Francisco	66%	73%	.155	
Seattle	75%	75%	.1575†	

Price of 60% Ammonia Gelatin is $0.01 per lb. higher than 40%

a Disc. from list Sept. 1939. *b* Also less 6% tax exemption. *d* Discount from jobbers' list Sept. 15, 1928. ‡ Sales tax included.

* Urban prices influenced by service charges or local storage and delivery regulations, do not consistently reflect quantity prices in less congested areas. *e* F.o.b. Louviers, Colo. *f* In boroughs of Kings, Queens and Richmond, and in Manhattan south of Canal Street, add delivery charge of $6.00 per trip. † F.o.b.

40% Ammonia Gelatin price ranges in other than urban areas, per lb. (except Seismograph Grades)

	C/L 20,000 lb. net	Tons	200 lb. lots
E. of the Miss., except Fla. and Me.	$0.105	$0.13	$0.15
W. of Miss. to Rocky Mtn. States, Fla. and Maine.	.11 –.1175	.135 –.1475	.155 –.1675
Rocky Mtn. States	.11 –.1225	.135 –.1525‡	.155 –.1725‡
Pacific N. W. States	.1075–.12	.1375–.15	.1575–.17
Pacific S. W. States	.1050–.1125	.135 –.1425	.155 –.1625

‡ F.o.b. Louviers, Colo., or Butte, Mont.

PILES, TIES—F.O.B.

PILES

Prices per linear foot, fir and pine, bark on, f.o.b. cars, New York. Fir based on Wash. and Ore. points to New York shipping area; pine based on freight from Norfolk.

Dimensions	Points	Length	By Rail — Pine	By Rail — Fir
12-in. at butt	6-in.	30 to 50-ft.	$0.33	....
12-in.—2-ft. from butt	6-in.	50 to 59-ft.	.34	....
12-in.—2-ft. from butt	6-in.	60 to 69-ft.	.35	....
12-in.—2-ft. from butt	6-in.	90 to 100-ft.	....	.515
13-in.—3-ft. from butt	5-in.	91 to 100-ft.	....	.56
14-in.—2-ft. from butt	6-in.	50 to 69-ft.	.40	.50
14-in.—2-ft. from butt	6-in.	70 to 79-ft.	.41	.54
14-in.—2-ft. from butt	5-in.	80 to 85-ft.	.52	....
14-in.—2-ft. from butt	5-in.	85 to 89-ft.	.55	....
14-in.—2-ft. from butt	5-in.	90 to 100-ft.	....	.575

RAILWAY TIES

Prices f.o.b., per tie for carload lots:		6"x8"x8' Untr.	6"x8"x8' Tr.	7"x9"x8'6" Untr.	7"x9"x8'6" Tr.
Boston	Oak	$1.50	....	$2.00	....
	Pine	2.00	$3.00*a*	2.50	$3.50*a*
New York	S. L. Sap Pine	1.43/1.54	2.59	1.76	2.86
	Mixed Oak	1.71	2.59	2.42	3.58
Birmingham	White Oak	1.00	1.60*a*	1.30	2.25*a*
Chicago	Red Oak	....	2.19*a*	....	2.87/3.00*a*
Los Angeles	Douglas Fir	1.10	1.75*a*	1.60	2.50*a*
Philadelphia	Red Oak	....	2.10*a,g*	....	3.25*a,g*
St. Louis	White Oak	1.48	....	2.04	....
	Red Oak	1.48	2.05*a*	2.04	2.83*a*
	Sap Pine or Cypress	1.35	....	1.91	....
San Francisco	Douglas Fir	1.25*b,e,f*	....	....	3.00*a,e,f*
Montreal	Birch or Maple	.85	.95	....†	....†

Tr.—Treated; Untr.—Untreated. *a* Creosoted *b* 6"x8"x8'6". *c* Empty cell. *d* Zinc. *e* Green. *f* F.o.b. cars. † Out of market. *g* January price, none later available.

CHEMICALS

Water, sewage treatment, road work, f.o.b. carlots, New York

Bleaching powder, in drums, f.o.b. works, per 100-lb.	$2.50– 3.10
Chlorine cylinders, liquid, per lb. delivered	.0325
Calcium chloride, 77–80%, flaked, 100-lb. paper bag, del'd. ton	18.50–35.00
Silicate of soda, 52 deg., in drums, f.o.b. works, per 100 lb.	1.40
Soda ash, 58%, in paper bags, per 100 lb. dense	1.15
Sulphate of aluminum, commercial, in 100-lb. bags, per ton	23.00–25.00
Sulphate of copper, in bbl., per 100-lb.	5.00

NEWS OF THE WEEK

(Continued from p. 79)

Water supply section of WPB on regional basis

The Water Division of the Office of Utilities has recently completed the anization of its Water Supply Section regional basis.

The new regional organization will mit the development of closer rela- between water utility operators the Water Division. The regional neer will cooperate with water utili- in connection with their problems of ntaining supply and service during war for all essential military, civilian war production needs. They will st in developing necessary projects after consultation with utility opera- prepare recommendations as to ma- ls and equipment which must be mmended quarterly to the WPB Re- ements Committee for allocation.

They will review all major project ap- ations from their respective districts cially as to relative essentiality.

ffective October 20, assignments are g made in that section as follows:

EF

illiam D. Williams, formerly consulting neer, Stillwater, Minn.

PUTY CHIEF

alter L. Leach, formerly engineer of gn, Havens and Emerson, Consulting neers, successors to Gascoigne & Asso- es, Cleveland, Ohio.

GION I—New England and New York egional Engineer, Bayard F. Snow, form- consulting engineer, Boston, Mass.

ss't. Regional Engineer, J. Walter Acker- , formerly chief engineer and Supt. Con- lated Water Co., Utica, N. Y.

GION II—Pa., N. J., Md., Del., Va., N. C., and D. C.

egional Engineer, George C. Sullivan, erly engineer with Blaw-Knox Co., Pitts- h, Pa.

ss't. Regional Engineer, T. L. Hudson, erly senior engineer, U. S. Engineering artment, Baltimore, Md.

GION III—Tenn., Miss., Ala., Ga., S. C., and Fla.

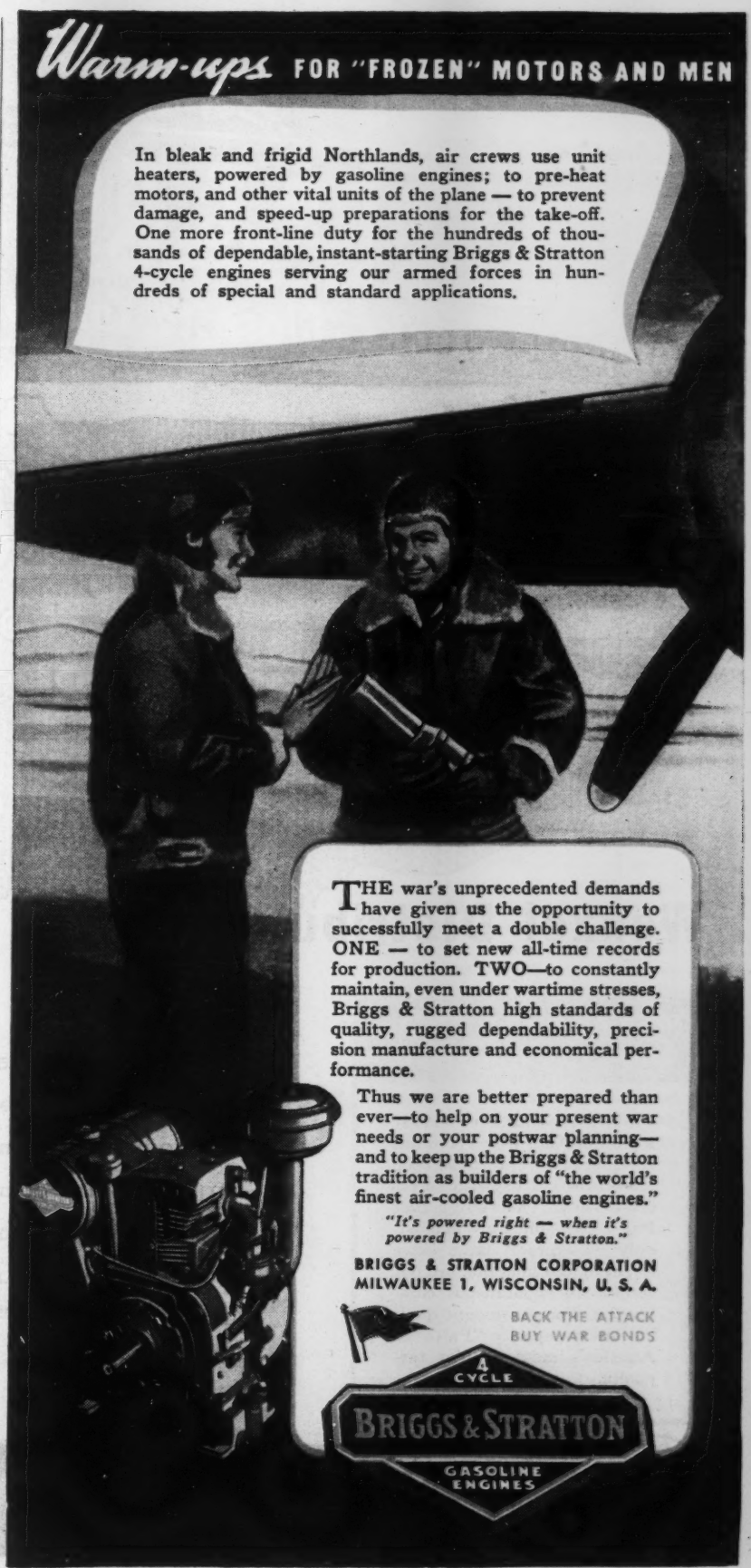
egional Engineer, Carl W. Smedberg, erly City Manager, Greensboro, N. C.

ss't. Regional Engineer, Howard S. efield, formerly assistant engineer, rles T. Main, Inc., Kingsport, Tenn.

GION IV—Wis., Ill., Ind., Mich., Ohio, Kentucky, and W. Va.

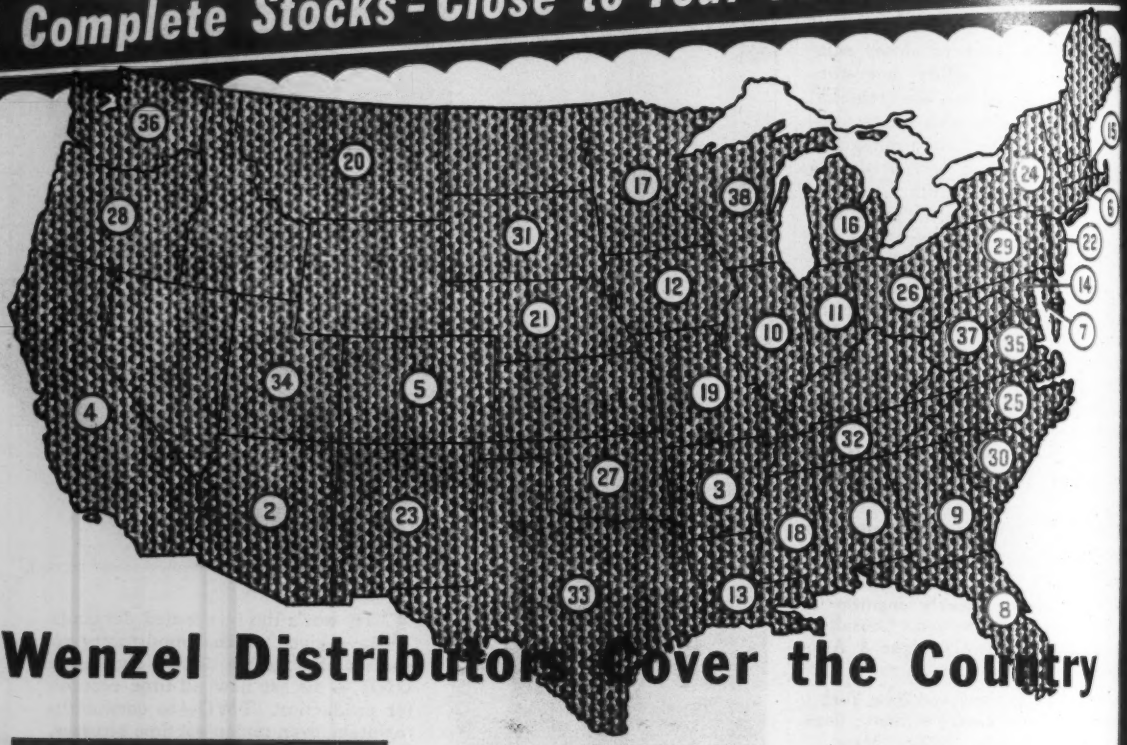
egional Engineer, Frederick H. Weed, erly Consulting Water Works Engi- ing Practice with Allen Hazen, Geo. W. er, and James H. Fuertes.

ss't. Regional Engineer, Robert L. Mc- h, formerly engineer, U. S. Dept. of iculture Soil Conservation Service, Wash-


Warm-ups FOR "FROZEN" MOTORS AND MEN
In bleak and frigid Northlands, air crews use unit heaters, powered by gasoline engines; to pre-heat motors, and other vital units of the plane — to prevent damage, and speed-up preparations for the take-off. One more front-line duty for the hundreds of thousands of dependable, instant-starting Briggs & Stratton 4-cycle engines serving our armed forces in hundreds of special and standard applications.
THE war's unprecedented demands have given us the opportunity to successfully meet a double challenge. ONE — to set new all-time records for production. TWO—to constantly maintain, even under wartime stresses, Briggs & Stratton high standards of quality, rugged dependability, precision manufacture and economical performance.
Thus we are better prepared than ever—to help on your present war needs or your postwar planning—and to keep up the Briggs & Stratton tradition as builders of "the world's finest air-cooled gasoline engines."
"It's powered right — when it's powered by Briggs & Stratton."
BRIGGS & STRATTON CORPORATION
MILWAUKEE 1, WISCONSIN, U. S. A.
BACK THE ATTACK
BUY WAR BONDS
4 CYCLE
BRIGGS & STRATTON
GASOLINE ENGINES

TARPAULINS

Complete Stocks - Close to Your Jobs - No Priority



Wenzel Distributors Cover the Country

Why Para Outsells Any Other Brand in America

PARA Tarpaulins have strictly a paraffin base which contains no oil or clay. They have been air dried—not exposed to excessive heat. The result is that PARA Tarpaulins are dependably waterproof, have extra strength and long life, are not subject to spontaneous combustion. For paramount quality always specify "PARA"—America's most popular tarpaulin.

WHEN you need tarpaulins—and need 'em *fast*—'phone the nearest Wenzel Distributor. His stocks of the nationally famous PARA Tarpaulins are complete—all popular sizes and weights. You can depend upon superior service, immediate shipment, and a product that users agree is "Tops in Tarps." No priorities necersary.

YOUR GUARANTEE GENUINE PARA PURE PARAFFIN BASE WATERPROOF TREATMENT

H. WENZEL TENT & DUCK CO

ST. LOUIS, MO.

File This List of Conveniently Located PARA Tarpaulin Distributors

YOUR GUARANTEE GENUINE PARA PURE PARAFFIN BASE WATERPROOF TREATMENT

TARPAULIN DISTRIBUTORS

1—ALABAMA
Moore-Handley Hardware Co., Birmingham
Owen-Richards Co., Birmingham

2—ARIZONA
O. S. Stapley Co., Phoenix

3—ARKANSAS
Speer Hardware Co., Fort Smith
R. A. Young & Son, Fort Smith

4—CALIFORNIA
Industrial Equipment Co., Los Angeles

5—COLORADO
Durango Mercantile Co., Durango

6—CONNECTICUT
Gesner Equipment Corp., Hamden

7—DISTRICT OF COLUMBIA
Hudson Supply & Equipment Co., Washington, D. C.

8—FLORIDA
I. W. Phillips & Co., Tampa

9—GEORGIA
Beck & Gregg Hardware Co., Atlanta

10—ILLINOIS
Becker Equipment & Supply Co., Chicago
Clark & Barlow Hardware Co., Chicago

11—INDIANA
Standard Equipment & Supply Co., Hammond
Van Camp Hardware & Iron Co., Indianapolis

12—IOWA
Harry Alter & Sons, Davenport
Pecaut Industrial Supply Co., Sioux City

13—LOUISIANA
C. T. Patterson Co., Inc., New Orleans
Pelican Well Tool & Supply Co., Shreveport

14—MARYLAND
General Supply & Equipment Co., Baltimore

15—MASSACHUSETTS
Hedge & Mattheis Co., Boston
Parker-Danner Co., Boston

16—MICHIGAN
Eddy & Cuthbert, Lansing
C. L. Gransden & Co., Detroit
Krueger Machinery Co., Saginaw

17—MINNESOTA
Thorman W. Rosholt Co., Minneapolis

18—MISSISSIPPI
Contractors Material Co., Jackson

19—MISSOURI
Brown-Strauss Corp., Kansas City
The Victor L. Phillips Co., Kansas City

20—MONTANA
Billings Hardware Co., Billings
A. M. Holter Hardware Co., Helena
Marshall-Wells Co., Billings

21—NEBRASKA
Anderson Equipment Co., Omaha

22—NEW JERSEY
Daie & Rankin, Inc., Newark

23—NEW MEXICO
Charles Ilfeld Co., Albuquerque

24—NEW YORK
Keystone Builders Supply Co., Rochester
New & Used Equipment Co., Long Island
Rupp Equipment Co., Buffalo
Syracuse Lumber Co., Syracuse
Trevor Corp., Buffalo
J. H. Welch Co., Inc., Buffalo
R. B. Wing & Son Corp., Albany

25—NORTH CAROLINA
Constructors Supply Co., Inc., Durham
Contractors Service Co., Charlotte

26—OHIO
Moriarty Machinery Co., Toledo
The W. T. Walsh Equipment Co., Cleveland

27—OKLAHOMA
Leland Equipment Co., Tulsa
Mideke Supply Co., Oklahoma City
The Victor L. Phillips Co., Oklahoma City

28—OREGON
May Hardware Co., Portland
Woodbury & Co., Portland

29—PENNSYLVANIA
Austin Supply Co., Philadelphia
Dravo-Doyle Co., Pittsburgh

30—SOUTH CAROLINA
C. D. Franke & Co., Inc., Charleston

31—SOUTH DAKOTA
The Dakota Iron Store, Sioux Falls

32—TENNESSEE
Keith-Simmons Co., Inc., Nashville
C. M. McClung & Co., Inc., Knoxville
Orgill Brothers & Co., Memphis
Stratton-Warren Hardware Co., Memphis

33—TEXAS
Amarillo Hardware Co., Amarillo
Peden Iron & Steel Co., Houston
W. H. Richardson Hardware Co., Austin
Sabine Supply Co., Orange
The Walter Tips Co., Austin
Zork Hardware Co., El Paso

34—UTAH
Geo. A. Lowe Co., Ogden
Strevell-Paterson Hardware Co., Salt Lake City

35—VIRGINIA
B. T. Crump Co., Inc., Richmond
Noland Co., Inc., Newport News

36—WASHINGTON
Hardware Distributing Co., Seattle

37—WEST VIRGINIA
West Virginia Tractor Equipment Co., Charleston

38—WISCONSIN
Hunter Tractor & Machinery Co., Milwaukee

14

COMPANY

YOUR GUARANTEE GENUINE PARA PURE PARAFFIN BASE WATERPROOF TREATMENT

ington, D. C., and prior to that Engineer, Burns & McDonnell, Consulting Engineers, Kansas City, Mo.

REGION V—N. D., S. D., Minn., Nebr., Iowa, Kansas, Mo., Okla., Ark., Texas and La.

Regional Engineer, Ray B. Plummer, formerly assistant chief engineer, Stuart-Warner Corp., Green River Ordnance Plant, Dixon, Ill.

Ass't. Regional Engineer, William J. Keays, formerly senior conservationist, U. S. Indian Service, C. C. C. Division, Phoenix, Arizona.

REGION VI—Wash., Mont., Oreg., Idaho, Wyo., Calif., Nevada, Utah, Colorado, Arizona, and N. Mexico.

Regional Engineer, Gerald E. Arnold, Sanitary Engineer (R), U. S. P. H. S. under special assignment. Formerly, sanitary engineer, San Francisco Water Department.

Ass't. Regional Engineer—To be appointed.

With the exception of Mr. Arnold in Region No. 6, these engineers will have headquarters in Temporary R Building, Washington, D. C. Mr. Arnold will have his headquarters at the WPB District Office at 1355 Market St., San Francisco, California. Applications for water supply projects from water utilities should be sent to Washington or to the WPB Field Offices as in the past, depending on the type of application.

• • •

Mississippi Valley Ass'n for wide flood control

Completion of national flood control facilities to be built and operated by Army engineers was urged unanimously as a war emergency measure by the Mississippi Valley association at its 25th annual convention in St. Louis recently, and it was proposed that Congress appropriate funds for the program as soon as possible.

The association also passed a resolution opposing regional or valley authority bills pending in Congress "because these authorities are planned as federal monopolies and will interfere with the rights and jurisdiction of the states over their land and waters."

The plan for the Missouri river which the association recommended for adoption called for the comprehensive multiple-purpose development of stream and tributaries, including flood protection works at Kansas City, Omaha and Sioux City.

Federal construction of a sea level canal from New Orleans to the Gulf of Mexico deep enough to accommodate the largest ships was urged as a means of providing the midwest with an ocean outlet for commerce.

One of the speakers was Maj. Gen. Eugene Reybold, chief of Engineers, U. S. Army. He said, in part:

"More than 7,000 miles of improved

STRUCTURAL CLAY BUILDING TILE, BRICK AND LIME—DELIVERED

	STRUCTURAL CLAY TILE—PARTITION—SCORED Per M. lots of 2,000 pieces or over, 3x12x12 in.	4x12x12 in.	8x12x12 in.	STRUCTURAL CLAY TILE—LOAD BEARING—SCORED Per M. lots of 2,000 pieces or over, 8x12x12 in.	10x12x12 in.	12x12x12 in.	BRICK Per M. in quantity. Common backing	Straight hard	LIME Per ton, Hydrated finishing	In paper, Common hydrated	Carload Pulver or lum
Atlanta	$104.00	$114.00	$199.00	$234.00	$244.00	$250.00	$13.50	$18.04	$26.54	$15.04	$15.00
Baltimore	84.00	90.00	170.00	200.00	260.00	320.00	15.00*k*	19.00*k*	18.00	13.00	2.50
Birmingham	80.00	85.00	160.00	191.00	252.00	288.00	14.50	17.00	18.11	13.64	2.25
Boston	89.35*a*	93.30*a*	178.70*a*	202.50	271.80	308.70	16.50*i*	19.50*i*	17.50†	12.50†	14.92
Chicago	72.00	77.00	145.00	197.00	243.00	278.00	12.50	13.50	17.00	15.00	12.50
Cincinnati	65.55	69.90	131.20	148.70	210.35	240.45	22.00	22.00	15.50	13.00	.....
Cleveland	60.00	64.00	120.00	144.00	193.00	221.00	17.00	17.00	15.75*j*	13.25*j*	3.00
Dallas	62.50	67.50	135.00	162.00	212.50	263.00	13.50*i*	15.00*i*	19.00	15.00	.95
Denver	84.80	95.40	153.70	178.20	212.00	227.90	14.50	18.00	25.00*j*	17.00*j*	20.00
Detroit	86.05	91.80	172.10	213.00	268.00	330.00*e*	20.00	21.00	18.00	16.00	16.00
Kansas City	67.00	69.00	89.00*c*	128.00	163.00	189.00	15.50	16.50	19.32	13.00	10.92
Los Angeles	73.50†*r*	89.50†*r*	128.00†*r*	210.00†*r*	368.00†*r*	460.00†*r*	13.50	15.00	16.50	17.50	17.50
Minneapolis	81.95*b*	87.40*b*	148.70*b*	.....	179.30*b*	249.35*b*	13.60	15.60*g*	21.00	16.00	19.00
Montreal	99.10*a*	105.65*a*	154.75*a*	104.65*at*	154.75*au*	155.25	24.16†*u*	27.25†*u*	24.60*u*	18.00*u*	.....
New Orleans	72.00	72.00	135.00	162.00	210.00	260.00	14.00	.....	18.30	12.08	14.10
New York	78.40	83.60	115.00*c*	193.30*h*	238.80*h*	295.60*h*	16.50/17.50	.....	20.00	14.00	17.00
Philadelphia	85.30	91.00	170.50	186.30	235.00	261.10	17.00	20.00	19.00	13.00	15.00
Pittsburgh	62.35	66.55	124.75	140.25	173.25	198.00	17.50	19.50	17.90	15.40	2.55
St. Louis	67.00	95.00	130.00	190.00	244.00	290.00	18.00	17.00	22.00	18.00	2.50
San Francisco	96.00	108.00	144.00	.....	.....	.....	19.00	.....	24.00	23.00	2.50
Seattle	115.00	125.00	230.00	.....	.....	.....	20.00*f*	21.00*f*	20.00*s*	20.00*s*	20.00

† F.o.b. *a* Smooth. *b* Carload lots delivered to job. *c* 6x12x12 in. *d* Not load bearing. *e* 48 lb. tile. *f* Less $1.00, ½ cash 15 days, balance 30 days. *g* Selected common. *h* F.o.b. Perth Amboy, N. J. *i* F.o.b. Warehouse only. *j* LCL. *k* $1.00 discount if paid in 10 days. *l* Lump. *m* Per bbl., 180 *n* Per sack 100 lb. *o* Per bbl., 200 lb. *p* 280 lb. bag. *r* 5% discount 10 *s* 2% discount for cash. *t* 5½x8x12. *u* 8% sales tax included.

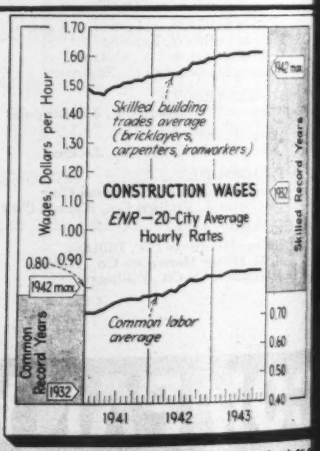
PAINT, ROOFING—F.O.B. CARLOAD LOTS

	RED LEAD Per 100 lb. in 600-lb. (Approx.) bbl. Dry *a*	WHITE LEAD Per 100 lb. in oil	READY-MIXED PAINT Per gal., drums Graphite *b*	Aluminum *b*	Ferric Oxide *d*	ROOFING SUPPLIES Carload lots f.o.b. factory Rolls, slate surfaced, 85–90 lb. per sq.	Asphalt felt, per 100 lb.	Tar felt, per 100 lb.	Asphalt coating per gal.	Tar pitch 350 lb. bbl. per ton
Atlanta	$10.25	$14.125	$1.30	$2.25	$1.20	$1.90	$1.61	$1.61	$0.27	$29.00
Baltimore	10.00	13.75	2.00	3.00	2.50	2.30	2.70	2.70	.40	29.00
Birmingham	10.25	14.125	2.35	3.50*r*	1.98*r*	2.04	1.97	1.97	.32	28.35
Boston	10.00	13.75	1.65	....	2.30	2.10‡	1.65*h*‡	1.65*h*‡	.50‡	21.00
Chicago	10.00	13.75	....	....	....	1.75*hf*	1.74*hf*	1.82*hf*	.33*f*	23.00
Cincinnati	10.00	13.75	1.70	2.90	1.60	2.40	2.39*h*	2.39*h*	.36	21.00
Cleveland	10.00	13.75	2.10	2.90	1.95	1.93	1.83*h*	1.83*h*	.35	29.00
Dallas	10.00	14.50	1.88	2.11*n*	.05*l*	1.75*h*	1.66*h*	1.66*h*	.35	39.00
Denver	10.50	14.25	1.65	14.25*k*	.27*l*	2.45	3.15	3.15	.35	28.00
Detroit	10.00	13.75	1.75	3.00	1.60	2.10	2.16	2.16	.50	23.00
Kansas City	10.00	13.875	2.39*g*	2.55*gr*	2.16*g*	2.10	2.30	2.30	.28	27.50
Los Angeles	10.25	14.25	1.60	2.25	2.30	2.10	1.50	....	.45	.....
Minneapolis	10.00	13.875	....	....	....	1.75*i*	1.66*hi*	1.66*hi*	.32	23.00
Montreal	9.25	6.25	2.50*p*	4.90*p*	3.15*p*	2.67	2.47	2.07	.94	1.85
New York	10.00	13.75	2.03	....*r*	1.64	1.66	1.58*h*	1.58*h*	.26	25.00
Philadelphia	10.00	13.75	1.60/1.80	2.20*r*	1.55	1.75	1.66	1.66	.32	23.00
Pittsburgh	10.00	13.75	1.05	1.95	.80	1.95	1.94*h*	1.94*h*	.34	26.00
St. Louis	10.00	13.75	2.28*s*	2.89*s*	1.96*s*	1.66	1.66	1.66	.28	23.00
San Francisco	10.25	14.00	1.80	2.75*n*	1.35	1.71	2.40	2.40	.33	19.50
Seattle	10.25	14.25	1.90	3.00	....	2.15	2.16*h*	....	.35	26.50

‡ Delivered. Note: Red lead in oil 50c. higher than white lead in oil. *a* Red lead prices change frequently due to pig lead price changes. *b* U. S. War Dept. Spec. 3-49A. *c* ASTM Spec. D266-31. *d* 80% minimum ferric oxide. *e* Subject to 25% discount. *f* Distributors' price to contractors. *g* 5 gal. can. *h* Per roll, 65 lb. *i* Minneapolis and vicinity. *j* Asphalt pitch. *k* Per 100 *l* Per lb. *m* Per bbl. *n* May, 1941 price, no later quotation available. *p* P 8% sales tax. *r* Not available, except on priority rating; then quoted specia *s* December price.

SKILLED AND COMMON WAGE RATES—PER HOUR

	Brick-layers	Car-penters	Struct. Iron Workers	Hoisting Engineers	Plas-terers	Common Labor Building	Common Labor Heavy Const.
Atlanta	$1.50	$1.25	$1.50	$1.25	$1.50	$0.40	$0.50
Baltimore	1.75	1.375	1.80	1.625/1.80	1.50	.75	.75
Birmingham	1.75	1.25	1.50	1.25/1.50	1.50	.65	.65
Boston	1.625	1.50	1.65	1.875	1.667	.80/1.00	80/1.00
Chicago	1.75	1.70	1.76	1.75	1.825	1.10	1.10
Cincinnati	1.75	1.50	1.675	1.45/1.60	1.625	.85	.85
Cleveland	1.875*c*	1.55	1.75	1.75	1.75	1.00/1.25	1.00/1.25
Dallas	1.625	1.25	1.50	1.75	1.625	.60	.75/1.25
Denver	1.65*b*	1.50*b*	1.50*b*	1.50*b*	1.65*b*	.80*b*	.80*b*
Detroit	1.675	1.50	1.75	1.625/1.75	1.675	.90	.90
Kansas City	1.65	1.50	1.625	1.625	1.65	.90	.90
Los Angeles	1.50	1.35	1.625	1.375	1.667	.875	.875
Minneapolis	1.50	1.375	1.50	1.40	1.50*e*	.925	.925
New Orleans	1.50	1.25	1.50	1.50	1.375	.65	.75
New York	2.00*b*	1.85*b*	2.00	2.00*b*	2.00*b*	1.031	.95
Philadelphia	1.90	1.50	1.90	2.00	2.00	.825	.825
Pittsburgh	1.90	1.75	1.75	1.8125	1.875	.90	.80
St. Louis	1.75	1.50	1.75	2.00	1.75	.95	.95
San Francisco	1.875	1.50	1.75	1.50/1.75	1.75	.95	.95
Seattle	1.78	1.48	1.68	2.00	1.78	1.08	1.10
Montreal	.92	.81	.90	.76	.90	.46	.53



ENR Skilled Average; (Bricklayers, Carpenters, Ironworkers) $1.
ENR Common Average; $0.869

b 7 hr. day. *c* Prevailing rate on government work. *e* 30 hr. wk.

THAT BRIDGE OF TOMORROW CAN BE *planned* TODAY

As a highway or municipal engineer you have a double responsibility. Not only will you want to make your plans to provide jobs for returning service men and war workers, but these plans must fit a postwar world, the pattern of which is not yet clear.

You can find a practical answer to your postwar bridge problems on both of these counts by specifying ARMCO Multi Plate Pipe and Arches. This way you get a strong, durable, basic structure that can be easily installed by unskilled labor. At the same time you assure a flexibility in design and appearance that will enable you to conform to postwar standards. With ARMCO Multi Plate to support the load you can finish the bridge with any type of design and material you choose.

Other advantages include ease of transportation, quick assembly on the job site without special equipment, and freedom from maintenance.

Include ARMCO Multi Plate in your postwar plans even though you may not be able to get it for your immediate construction needs. After the war it will again be available for bridges, stream enclosures, large sewers and special drainage structures. Write us for complete data. Armco Drainage Products Assn., 575 Curtis St., Middletown, O.

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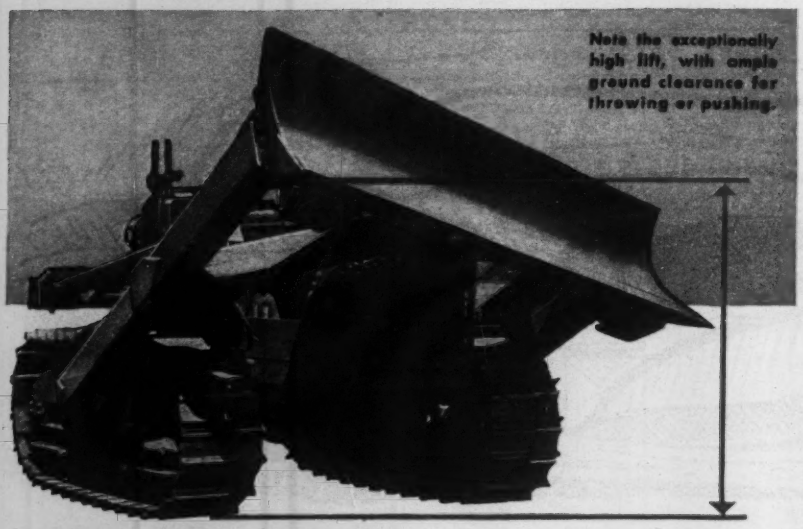
MULTI PLATE PIPE AND ARCHES



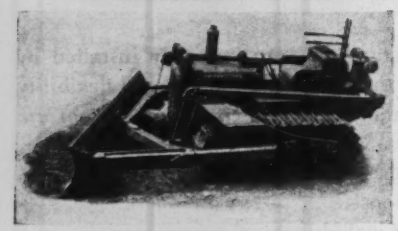
For Positive Action ✓ Smooth Performance ✓ Minimum Maintenance ✓ Full Visibility ✓ Efficient Teamwork.

The Heil Co.

announces new

Cable Dozers

for International Harvester TracTracTors



HEIL CABLE DOZER WITH TRAILBUILDER BLADE

Heil Power Control Unit gives Cable Dozers quick, positive, smooth cable control — with little effort. Simple, dependable, troublefree. Levers adjustable to suit operator's reach.

Designed to work together—through cooperation of the International Harvester and Heil Co. engineering departments — the International Harvester TracTracTor and this new Heil Cable Dozer provide a perfectly balanced team.

The Cable Dozer "looks right" on the tractor — and it does not distort or unbalance the operation of the tractor one bit more than its compact, trim, modern appearance suggests. Simplified mounting avoids obstructing operator's view — gives him full, free vision ahead. The machine "feels right" — performs smoothly, gives fast, positive action under the toughest conditions.

Trailbuilder Blade and "A" frame are interchangeable with the Bulldozer blade and frame. Rugged construction assures long, trouble-free life . . . Ask your International TracTracTor Distributor for further details.

SEE YOUR INTERNATIONAL TRACTRACTOR DISTRIBUTOR

Write for free bulletin R-14

ARMY E NAVY

THE HEIL CO.

GENERAL OFFICES • MILWAUKEE 1, WISCONSIN

channels extend as navigable thoroughfares to all sections of the Mississippi Valley, providing outlets to the Great Lakes and the Gulf of Mexico and furnishing means of floating to needed points the nation's agricultural and manufactured products. At present a $1,000,000,000 improvement program is authorized or planned for the Mississippi basin and it could be expanded quickly to double this amount.

"Postwar flood control and navigation projects should go far toward minimizing the effects of the floods which have ravaged this area periodically. Three-fourths of the lower Mississippi is already fully protected and the remainder partially protected. Approved projects are already well started in the Ohio, Upper Mississippi, Arkansas and White basins and plans of similar scope are available for the Missouri."

. . .

Public officials to aid 3-county plan in Michigan

Meeting in the conference room of the Engineering Society of Detroit, an organization committee for the projected Tri-County Council on Area Planning recently decided that public officials and citizens should make up the membership of the proposed regional council to guide the planning. In addition to the plan adopted by the committee, two other proposals were submitted by David D. Henry, executive vice president of Wayne University. One proposal was to head the council with public officials alone, and the second was to head it solely with citizens not holding public positions, but neither of these was favorably considered. The meeting was attended by officials from Wayne, Oakland and Macomb counties of Michigan, and by representatives of various civic and metropolitan groups.

Objectives of the proposed Tri-County Council as outlined by Dr. Henry, included: To supply and assist in interpreting information concerning planning conducted by official agencies; to provide a continuing inventory of planning within the area with the aim of obtaining public appraisals of area coordination and of interpreting public attitudes; to provide machinery for obtaining ideas from those not associated officially with planning agencies; to facilitate communication among planning agencies, and to assist in formulating programs of action to bring plans into reality. As reported by Dr. Henry, it will not be the function of the council to interfere in any way with the planning going forward under the jurisdiction of any other agency, and the council would have only such authority as comes from the influence engendered by the prestige of its

embers, the effectiveness of the coun-l's program and the cooperation of the gencies concerned.

. . .

Old narrow gage engine drafted for war service

With many a vigorous chug left in er soot-caked flues, a 35-year old en-ine known as "Old 76" operating on e Colorado & Southern Railway's nar-w gage line between Leadville and limax, Colo., has made her last run this country. She soon will be sent Alaska, according to John D. Walker, eneral manager of the C. & S., along ith other rolling stock of the same ilroad, to aid in military operations that area.

The 14-mi. stretch of steep, tortuous ountain grade containing 130 curves, which Old 76 operated, was the last f 384 miles of narrow gage operated y the railway. New standard-gage rail-ay equipment will take the place of ld 76 and, to make the changeover ithout delaying shipments from the limax diggings, new tracks were laced at standard distance outside of e worn rails.

Old 76 ably performed her duties to e mines and miners of central Colo-do during her many years of up-hill ork, hauling millions of dollars in gold nd silver bullion in the Leadville dis-ict until the war. Since then she has en hauling calcium molybdite from e huge mine of the Climax Molyb-enum Company for shipment of the etallic products for American war in-ustry and lend-lease.

BRIEF NEWS

The Iowa state highway commission nd public safety department have agreed permit certain trucks carrying war aterials to use Iowa highways even if ey do not conform to weight, length nd height laws. Properly certified trucks ill be cleared by highway patrolmen nd weight inspectors upon request rms made out by designated army ansportation officers. The arrangement plies to government-owned or leased ucks.

Wichita, Kan., whose population has ore than doubled since 1920, will be planned completely in the next two ars. The city planning commission will udy development of outlying areas, reets, parks and parkways, improve-ent of sewerage and drainage facilities,

Heil Hydraulic Bulldozer

—tailormade to Cletrac Tractor

. . . gives you full visibility, perfect balance, the rugged strength suggested by its clean, modern appearance

Sensitive Heil Hydraulic System gives fast, accurate control over blade

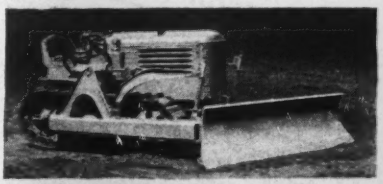
You have to see this popular Heil unit in action to appreciate its speed and flexibility — its ability to stand up and come through dependably where the going is tough. Sound engineering design, reduced to the utmost simplicity, guarantees few service interruptions and cuts maintenance costs.

Trailbuilder blade readily angled to right or left for side-casting in new cuts. Bulldozer blade takes rocks and stumps without waver.

The hydraulic control is positive and accurate in all positions —makes this the ideal machine for clean-looking jobs of finishing or landscaping that you can be proud of.

For full loads and more yardage per day and per year — at lower cost — use Heil Earth-moving Equipment.

Write for bulletins.



FOR CLETRAC TRACTORS, MODELS A, B, D, F

Trailbuilder blade and "A" frame are interchangeable with the bulldozer blade. Low hydraulic pressure is possible because of the large diameter hydraulic cylinders. R-15

SEE YOUR CLETRAC TRACTOR DEALER

ARMY E NAVY

THE HEIL CO.

GENERAL OFFICES • MILWAUKEE 1, WISCONSIN

Let Refinite Handle Your Special Water Problems

Our laboratories and technical staff are prepared to handle the water conditioning problem of any industrial process. Let Refinite give you the benefit of their 26 years of experience. Our equipment includes the latest development in clarification, filtration, ironic exchangers, condensate oil removal, PH control, taste, odor and color removal, etc.

THE REFINITE CORPORATION

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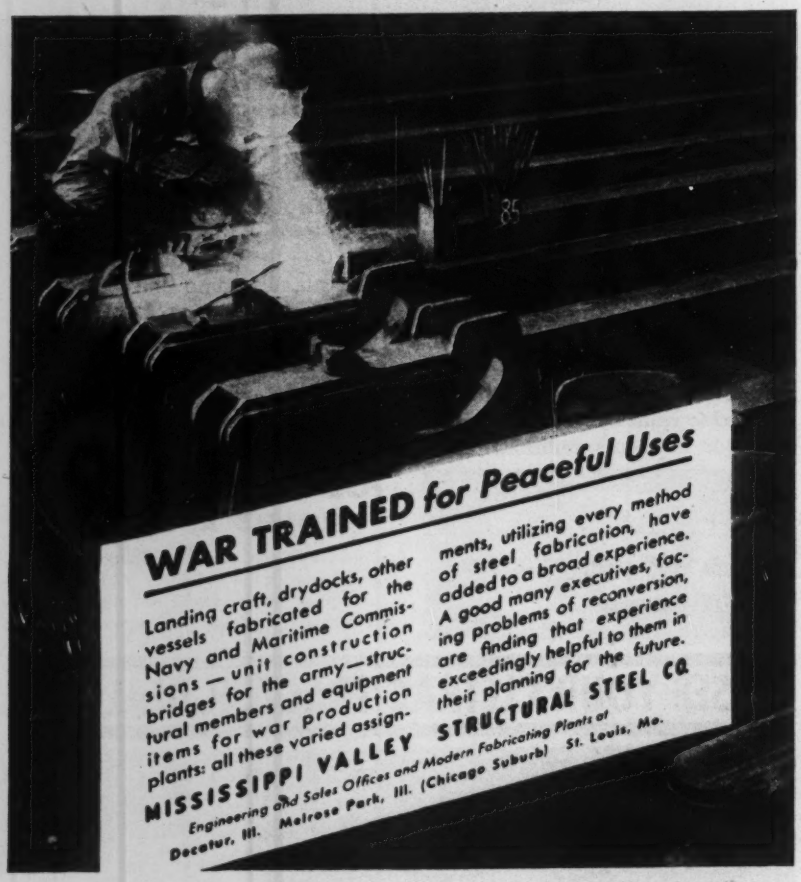


WAR TRAINED for Peaceful Uses

Landing craft, drydocks, other vessels fabricated for the Navy and Maritime Commissions — unit construction bridges for the army — structural members and equipment items for war production plants: all these varied assignments, utilizing every method of steel fabrication, have added to a broad experience. A good many executives, facing problems of reconversion, are finding that experience exceedingly helpful to them in their planning for the future.

MISSISSIPPI VALLEY STRUCTURAL STEEL CO.

Engineering and Sales Offices and Modern Fabricating Plants at
Decatur, Ill. Melrose Park, Ill. (Chicago Suburb) St. Louis, Mo.

new subdivision regulations, zoning a transportation, according to the Int national City Managers Association.

The Canadian Government is build a military road in Newfoundland at estimated cost of $1,478,000, the Air M istry reports. The road runs betwe Gander and Bishop Falls and from Lew porte to Notre Dame Junction on a rig of-way supplied by the Newfoundla Government. It is being built by the At Construction Co., of Montreal.

The City Council of Quebec, Que., decided to sell lots in Limoilou Ward $5 per lot to citizens upon condition th for a single dwelling, three lots are p chased, and within twelve months a ho valued at at least $2,000 shall be bu For a 2-family house four lots are to bought and a dwelling worth not l than $3,000 is to be erected within months.

Capt. J. Farmer, engineering recru ing officer, of the Little Rock, Ark., d trict, has announced that 100 volunte specialists have brought the Little Ro district to 142 percent of its quo at the present time.

Fourteen young women college grad ates are nearing completion of a 10-we engineering course at Drexel Institute Technology, Philadelphia, Pa. For hours each week they study mathemati engineering, drawing, applied mechani surveying and material strength. Up completion of the course they will certified for positions as junior enginee in the U. S. Engineers' Office. The duties will include field engineering, viewing contracts and specifications a checking materials. Prof. Ronald Giles is in charge of the course.

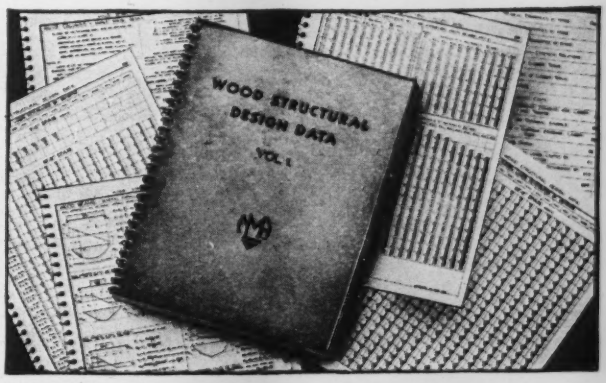
The Quebec Provincial Department Public Works has at present under co struction 30 steel and concrete bridg of varying sizes. At least 2000 of Qu bec's 6,000 bridges are of permane steel and concrete construction, and t remaining 4,000 wooden structures w be replaced as fast as wartime restri tions, particularly that regarding ste and manual labor, are raised.

The new paved highway under co struction for the past two years conne ing Montgomery and Tuscaloosa, Al is now open to traffic. The road is miles long and saves 43 miles over t old route by way of Uniontown. It is al announced that Highway 5, a short roa between Birmingham and Mobile t Centerville, Marion, Browns, Staffo Catherine, Grove Hill and Jackson h been thrown open to traffic. This roa cuts out considerable mileage betwe Birmingham and Mobile.

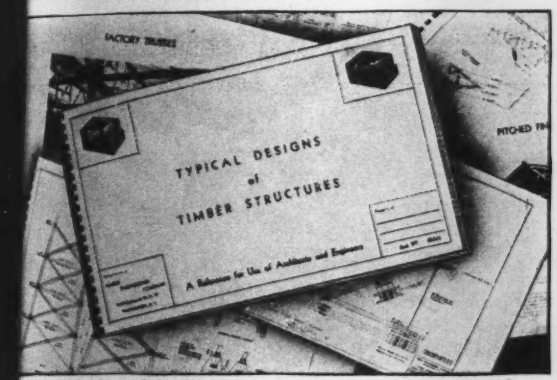
SERVICES TECO HAS FOR YOU

WHEN YOU BUILD WITH WOOD

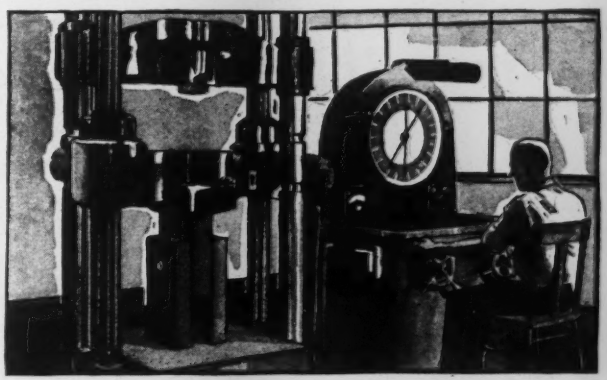
NSULTING SERVICE. Teco maintains a staff of engineers consult with architects and engineers on their design prob-s. Teco Connector distributors and fabricators in all parts the country also render helpful services.



DESIGN DATA SERVICE. Teco has available for architects and engineers complete data on all phases of timber design, including tables and charts on timber beams, columns, floors, connector loads, bolt loads, stresses, etc.



YPICAL DESIGN SERVICE. "Typical Designs of Timber ructures"—a 100-page book—is available to architects and gineers free upon request. Copies of several hundred other signs of typical Teco Timber Structures are also available on quest.



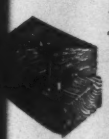
RESEARCH SERVICE. Teco conducts a continuous research program through laboratories as well as sponsoring research at outstanding engineering colleges to increase the design knowledge of timber designers.

ood is often referred to as the *rediscovered* material, e to its development by science for plastics, lamina-ons and heavy construction.

Engineering science that developed the Teco Connec-r System of timber construction is responsible for the sition timber occupies as a leading heavy construction aterial.

The Teco timber system serves our war effort . . . it ill *serve you* in peace times too.

TIMBER ENGINEERING COMPANY
—Washington—Chicago—
Minneapolis—Portland.



The **TECO** *Ring Connector spreads the load on a timber joint over practically the entire cross-section of the wood . . . brings the full structural strength of lumber into play.*

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DRAWING PENCILS

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UNIFORMITY!—21 perfectly graded degrees, 6B to 9H and Tracing 1-2-3-4.
ECONOMY!—right down to the last inch.

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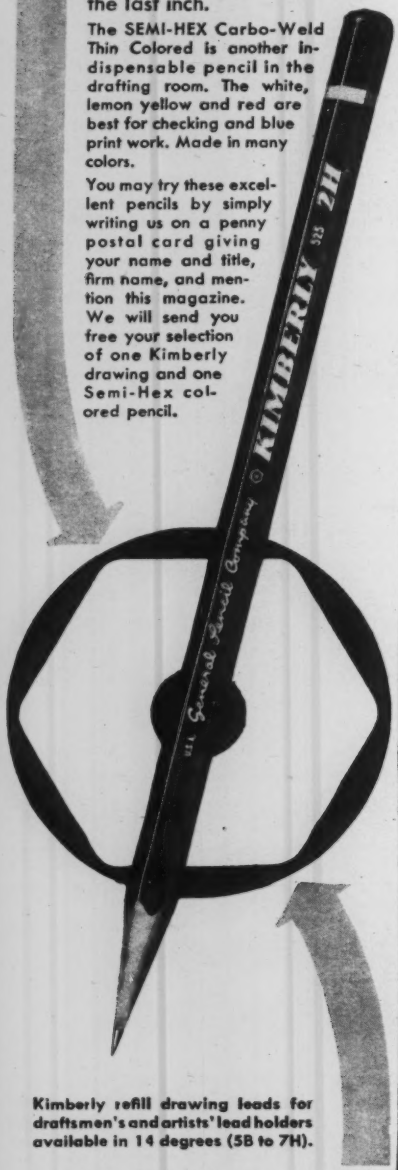
You may try these excellent pencils by simply writing us on a penny postal card giving your name and title, firm name, and mention this magazine. We will send you free your selection of one Kimberly drawing and one Semi-Hex colored pencil.



Kimberly refill drawing leads for draftsmen's and artists' lead holders available in 14 degrees (5B to 7H).

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General Pencil Company
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NEW AIDS TO THE CONSTRUCTOR

Face Shield

Designed to provide durable and convenient face protection from flying particles, a new M.S.A. Type H model may be quickly attached to "Skullgard" protective hats. The shield has a transparent visor, 14 in. wide and 6 in. long, 0.020, 0.040 or 0.060 in. thick of high-type clear plastic. Light or dark green visors, in 0.020-in. thickness only, can be furnished.

Easy upward or downward movement of the face shield is made possible because the fiber visor retaining strap is mounted on a pivotal joint The shield can be quickly removed if it is desired to use the Skullgard alone.—*Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh, Pa.*

• • •

"Protectioneered" Motor

Vital features of interest to motor users everywhere are embodied in a new all-purpose, continuous-duty, polyphase, squirrel-cage induction motor, according to the manufacturer's announcement. This new motor is called "protectioneered" because it has no moving external parts, and thus affords the operator complete safety.

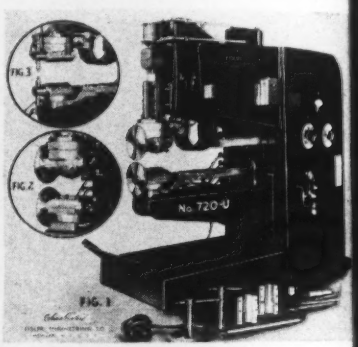
Constructed with a centrifugally-cast F-M Copperspun rotor, the new motor is fully protected against flying and falling chips and particles, dripping liquids,

etc. It has ball bearings sealed in cartridge-type housings, crossflow ventilation (in frames 224 to 363, inclusive) through inlets and exhausts at each end, and a frame cast in one piece, with rib section Where space is limited, a conduit can b brought up between the motor feet to tapped hole in the motor frame, and th conduit box cover assembled flush wi the frame. The motor is rated 40 deg. C and designed to carry 115 percent loa continuously without injurious heatin (1.15 percent service factor).—*Fairbanks-Morse & Co., 600 South Michigan Ave., Chicago, Ill.*

• • •

Seam/Spot Welder

Developed for circular and longitudina seam welding, and by a simple change o electrodes, for spot welding, the heavy duty Universal Resistance welder is o



compact construction and fine precision. Only the upper seam wheel is power driven by a 1-hp. motor of 1,425 rpm. Speed reduction is performed by means of a variable speed drive between the limits of 3/4-rpm. minimum to 2 1/4-rpm. maximum, corresponding to a surface speed of 2 ft. to 6 ft. respectively, with a 10 in. dia. seam wheel. This power transmission is used only for seam welding. In either seam or spot welding, the upper electrode attached to a big square ram, sliding in a proper guide-block, is actuated by a double acting air cylinder. Electrode pressure is adjustable by an air pressure regulating valve. The air system includes an air filter, indicating pressure gauge and an automatic lubricator. The welding transformer is available in 100, 150 and 200 kva. and larger sizes.

or 440 volts, 60 cycles, and provides ection of numerous points of heat regu- ion by heat settings with dial control, mitting a wide range of materials and cknesses. Other ranges of voltage and quencies are available.

The entire system is automatically con- lled. All accessories are mounted on a id, arc-welded box-type frame. The ctrodes are of wear-resistant copper oy of high electrical and thermal con- ctivity.—*Eisler Engineering Co., 740-9 South 13th St., Newark 3, N. J.*

• • •

Water Tester

Simple, rapid water tests may be per- rmed by a new test set for boiler-water ntrol analyses, it is claimed. The set cludes all the necessary apparatus and

micals for the determination of hard- ss, alkalinity, chloride, sulfite, and osphate. A special cabinet designed use on table or wall is provided. All paratus and chemicals are contained the cabinet, held in a secure position d ready for instant use. A portion of e opened cabinet door forms a conveni- t acid-resistant laboratory work table d a fluorescent light provides correct umination for the tests. The protection forded by the cabinet is said to mini- ze breakage and eliminate errors used by dust and dirt.—*W. H. and L. Betz, Gillingham and Worth Sts., rankford, Philadelphia, Pa.*

• • •

Diesel Engines

Reliability and low costs are among e advantages of two new diesel engines st added to its existing line of gas gines, according to the manufacturer's nouncement. Both engines are 4-cycle, l diesels.

Model D148 is a 2-cylinder unit with a aximum rating of 22 hp. It may be quipped for pulley drive, with or with- t clutch, or clutch and reduction gear, auxiliary power take-off. As a diesel ectric plant it may be direct-connected,

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- W. C. Bulette, President Brandt-Warner Mfg. Co.
- Frank C. Dana, Personnel Director Four Wheel Drive Auto Co.
- Wm. A. Faison, President Atlantic Steel Casing Co.
- Benjamin F. Fairless, President United States Steel Corp.
- H. W. Steinkraus, President Bridgeport Brass Co.
- J. W. Assel, Chief Engineer Timken Steel & Tube Co.
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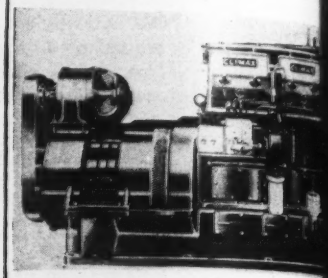
on a single base, with a 15-kva. g
ator. Model D297, a 4-cylinder unit
maximum rating of 44 hp., may be
ished with drive equipment simil
Model D148. A special feature is



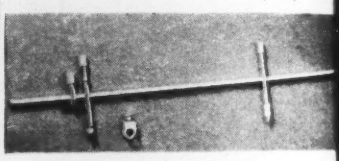
flywheel, clutch, generator or ma
gears may be installed on either or
ends, providing a radiator is not
D297 may also be used to power a 30
generator.

Other outstanding features of t
diesel engines are: One-piece crank
and cylinder housing; replaceable chr
nickel iron cylinder liners; and w
cooled exhaust manifold.—*Climax E
neering Co., Clinton, Iowa.*

• • •

Beam Compass

Featuring a micrometer adjustment
the pivot point to set the measurement
approximately 0.001 in. if necessary,
new No. 10 beam compass may be p
vided with 18, 24 or 36-in. bars, or long
A phonograph needle is used as the pi



pin. It is retained by a nut with a hole
the same taper, so that the pin proje
only a specified amount.

The compass includes a chuck pen
with standard lead or steel point, and
clip for fastening the pen, pencil

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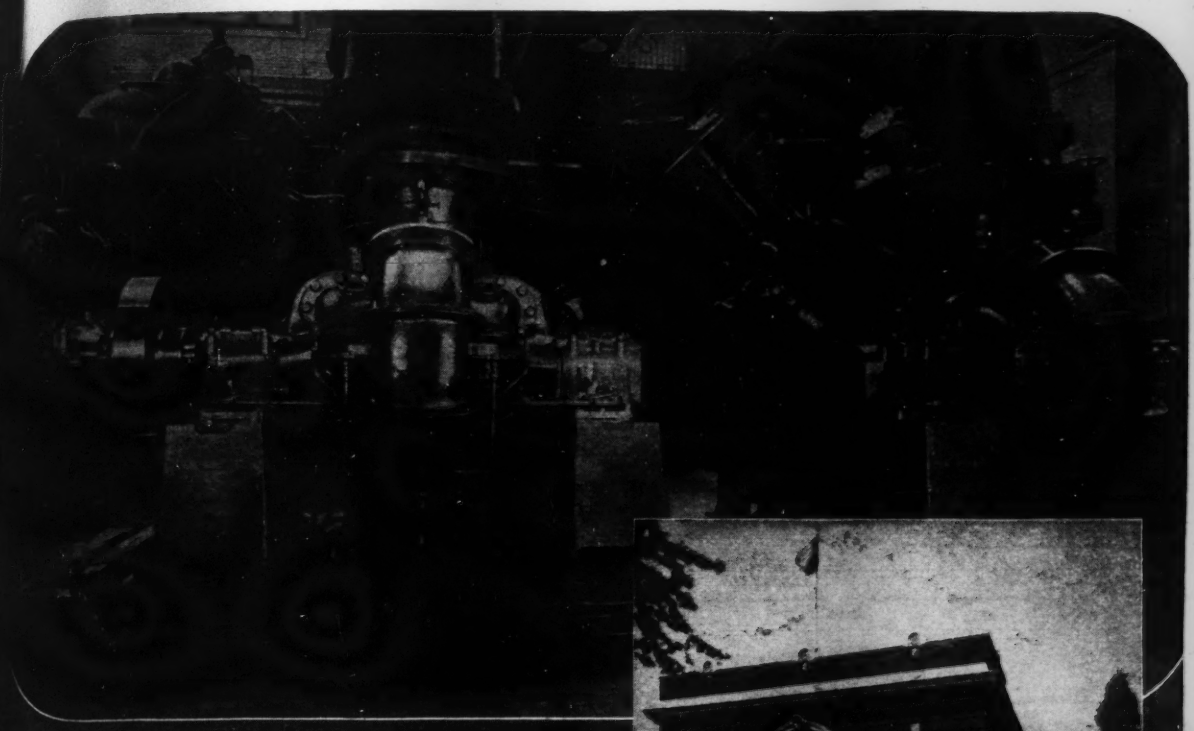


160 Million Gallons Daily

Thomas Jefferson Pumping Station
uses four Fairbanks-Morse thirty-inch, double-suction pumps

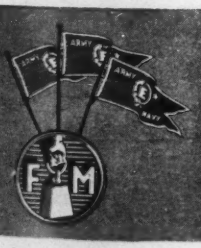
A group of four Fairbanks-Morse thirty-inch, double-suction, single-stage, split-case pumps gives the Thomas Jefferson Pumping Station in Chicago a total capacity of 160,000,000 gallons of water daily. Installation of these pumps departs from the conventional in that suction is horizontal and discharge is vertical. Water is taken from Lake Michigan at the Wilson Avenue Crib, brought through five miles of tunnel and discharged through twenty-three miles of feeder mains. Each of these big pumps is driven by a 1200 hp. motor.

Modern pumping equipment such as is found at the Thomas Jefferson Pumping Station, saves the taxpayers of any municipality real money. In many cases, old pumps, even if as good as when installed, exact at least a 10% power cost penalty. At that rate, new pumps soon pay for themselves.

Comparatively few cities require pumps with such large capacity as Chicago; but large or small, Fairbanks-Morse builds the right pump for the job.

Fairbanks, Morse & Co., Fairbanks-Morse Building, Chicago, Illinois.

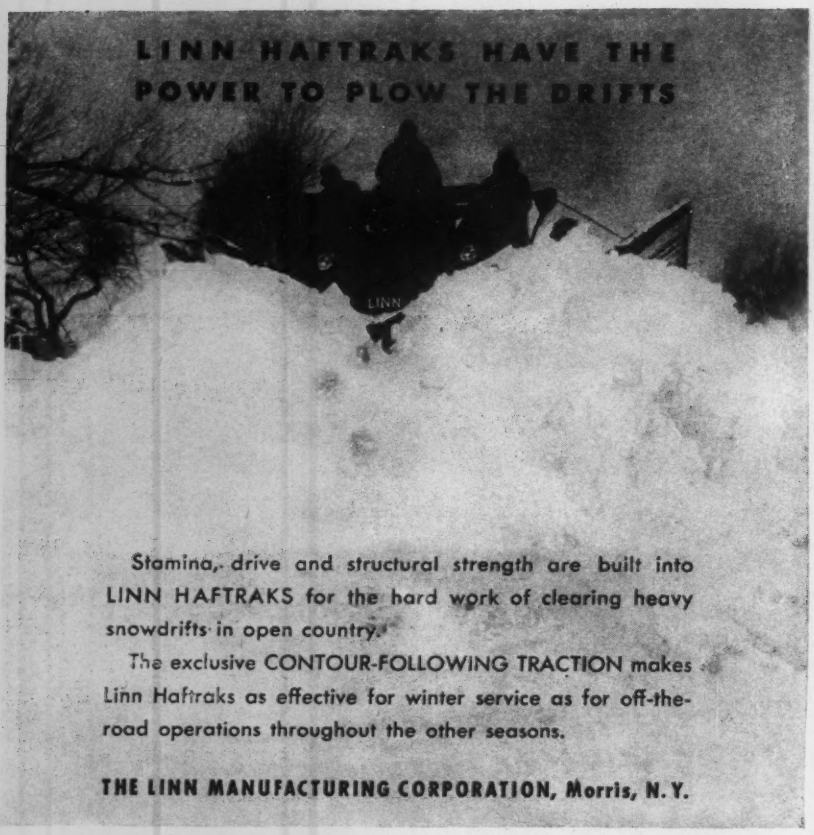
BUY WAR BONDS



FAIRBANKS-MORSE

DIESEL ENGINES
PUMPS
MOTORS
GENERATORS
WATER SYSTEMS
SCALES
STOKERS
FARM EQUIPMENT
RAILROAD EQUIPMENT

Pumps



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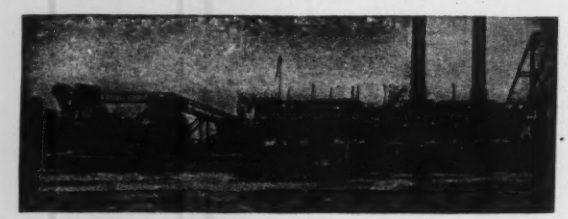

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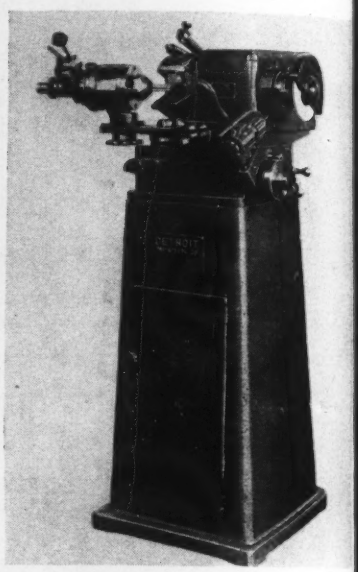
scriber anywhere on the bar.—*Mark Specialty Co., 406 Temple Bldg., Rochester 4, N. Y.*

• • •

Tap Reconditioner

A new spindle head is featured in a recently announced tap reconditioner. This head accommodates interchangeably a wide range of motor types for various service voltages, phases and frequencies. The tap chamfering unit is of precision collet type, and may be used with collets from the smallest machine



screw size to the 1¼-in. standard tap shank size, including long shank taper taps.

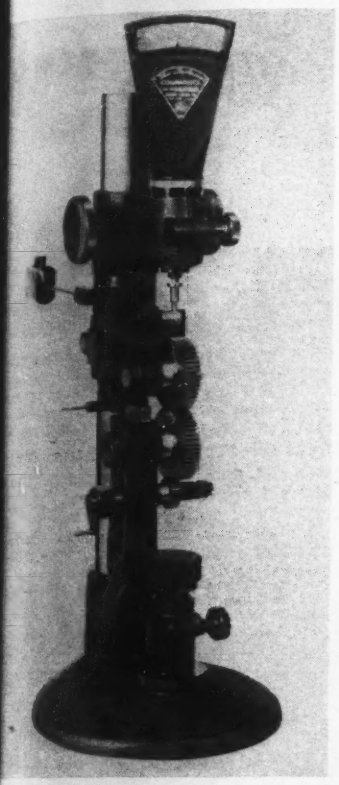
The reconditioner also performs spiral pointing and spiral point polishing. Standard motors for this machine are 220 or 440-volt 3-phase, and 110-volt single phase, for either 25 or 60 cycle service.—*Detroit Tap & Tool Co., 8432 Butler St., Detroit 11, Mich.*

• • •

Gear Tester

Precision gears may be readily inspected, and faults during manufacture detected and located, by the new "Comparitol" gear tester, it is claimed. The tester, which also checks the accuracy of completed gears, is of vertical construction, and requires little bench space. Center distance may be quickly checked by setting up the tester to the proper distance with gage blocks or standards. The master gear, or gear known to be correct, is placed on an arbor, and the gear to be tested is placed on another arbor in direct contact with the master. The master gear bracket has an adjustable counter-balance, so that the pressure between the master gear and the

ar to be tested is always uniform. The mparator head reads to 001 in. .0005 .0025 in. or .0001 in., as desired. This gear tester has a range of 1- to in. center distance with special attachents available to enable the inspector



check down to the smallest center disnce in highly precise gears.—*George cherr Co., 128 Lafayette St., New York 3, N. Y.*

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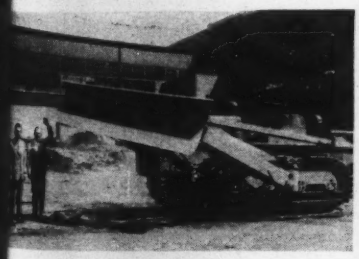

Earth Mover

Many new design and performance eatures are claimed for the Trailbuilder ust added to the manufacturer's line of arth-moving equipment.—*The Heil Co., Milwaukee, Wis.*

• • •

Payroll Calculator

Overtime as well as straight-time payoll calculations can be instantly figured, is claimed, with a new model payroll

BEFORE, DURING & AFTER!

BEFORE the war, NOVO pumps, hoists, engines, generators and pavement breakers were engineered and built to do their job well — on day in and day out performance.

DURING the war, NOVO ruggedness is fully meeting the increased demands of war and our equipment is serving in every war theater. Emergency production is teaching us new skills which will be a part of the post-war NOVO equipment.

AFTER the war, we will be in position to deliver NOVO equipment without your having to wait for time-consuming factory change-over. Because, standard NOVO products were found to satisfy war requirements, making drastic changes unnecessary. That puts you in position to get, from NOVO, the things you need to speed up such construction which will follow closely on the heels of peace.

We are in production on some types of equipment for civilian use on essential work. Tell us what you need NOW in the way of pumps, hoists, light plants, pavement breakers and engines.

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FOR SPEED, EARLY STRENGTH AND EXTRA PROTECTION

Vital wartime concrete construction work can proceed without delays despite cold weather or sudden temperature drops. Wasteful, costly waits between operations for re-use of forms can be cut . . . the protection period can be reduced.

SOLVAY Calcium Chloride added to the mix doubles the strength normally developed during early periods . . . overcomes slowing effects of low temperatures . . . permits re-use of forms and quicker finishing and use of concrete. It does not change the normal chemical action of portland cements, and makes for a denser, stronger, more waterproof concrete.

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calculator. Forty hours plus overtime are calculated in one operation, on one side of the device, for firms that require total pay check only. Straight time and overtime as separate items are figured on the reverse side.

The calculator shows hourly rates of pay from 40c. to $1.74, with half-cent spread between rates, and time periods up to 80 hours, with divisions of tenths and quarters of an hour.—*Berger-Brickner Co., 433 South Spring St., Los Angeles 13, Calif.*

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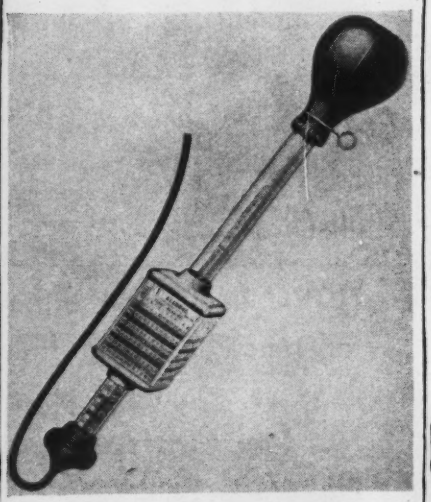
Freezetester

Anti-freeze protection starts with knowing what is in the radiator, and the Imperial No. 546-T High-Speed Freezetester gives quick and accurate information on all anti-freeze solutions approved by the

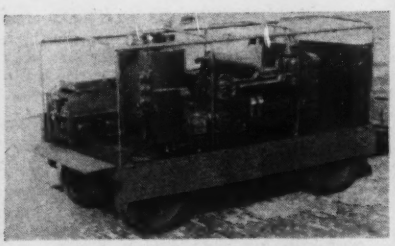


government. The one tester pictured, retailing under $6, will test all basic solutions of alcohol, methanol and ethylene glycol. Simpler testers are available for single solutions, for use where an entire fleet uses one kind of anti-freeze.—*Imperial Brass Mfg Co., 1200 W Harrison St., Chicago, Ill.*

• • •

Oil Reclaimer

To meet the serious problem of conserving and transporting lubricating oil



back of our battle lines, a mobile oil reclaiming unit has been developed.

"Oomph" DRAFTING

RE-SURFACE
Worn Boards. Modernize New Boards

PRECISION-IZE
Pencil Drawings For Perfect Prints

RELIEVE
Shortages of Men and Materials.

SPEED
Production, Yet Cut Costs.

NO-INK Drawing Board TOP

Adopted as Standard By Major Industries

Resilient drawing surface produces a sharp, opaque stroke in the drawing—results in perfect prints—makes inking unnecessary. The most perfect, most delightful surface to work on.

10 Years More Use From Old or Discarded Boards

Users are reordering in quantity. Over 25,000 NO-INK Drawing Board Tops already in use, saving man-hours, speeding production, renewing discarded boards, modernizing new boards. Costs so little.

We cut Tops to exact board size, no matter how large or how small. Attached by anybody in 10 minutes, ready for immediate use. Economize, modernize your drafting procedure. Write for catalog, prices and trial offer.

Est. 1911 Over 30 Years of Guaranteed Customer Satisfaction
W. H. LONG COMPANY, 425 N. Clark St., Chicago 10, Ill.

HYDRO-TITE

The dependable self-caulking joint compound for jointing cast iron water mains — uniform — easy to prepare — easy to use — in service for more than 30 years.

HYDRAULIC DEVELOPMENT CORPORATION
50 Church St., New York, N. Y.

FIBREX — A sanitary packing used like braided jute — will not breed bacteria — 30% lighter than jute — put up in 60 pound reels.

DRY BRAIDED
Fibrex

ALL PURPOSE Service.

Dig Ditches Faster —

with the Koehring Pull Shovel—because of lighter weight—longer reach—better vision—greater strength. Deep or shallow trenches are dug with equal speed and efficiency. Exceptionally high hoist line speed gets the loaded bucket out of the trench. Quick and easy dumping "gets rid of the dirt." All operations are faster, increasing production to a new "high." Easy steering and moving in tight spots, accurate boom control, stable operation, and quick moves on or between work locations are Koehring advantages. Koehring Pull Shovels are easily and quickly convertible to shovels, cranes or draglines.

KOEHRING COMPANY • *Milwaukee 10, Wis.*

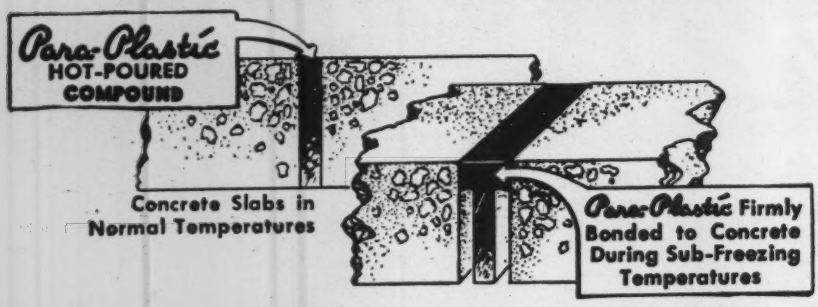
DEPEND ON YOUR KOEHRING DISTRIBUTOR to help you keep your equipment operating. Care for your Koehring equipment NOW, so it will serve you tomorrow. Koehring distributors have genuine Koehring parts. Koehring parts warehouses are at your service.

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

Para-Plastic

HOT-POURED RUBBER-LIKE WATERPROOF SEALING COMPOUND



Widely recognized and formerly known as Para-Plastic Hot-Poured Rubber Sealing Compound, "the effective waterproof seal"—Servicised has recently developed a VICTORY PARA-PLASTIC after many months of experimental research.

VICTORY PARA-PLASTIC is composed of non-critical materials, (containing no rubber) and fully conforms with Federal Specifications SS-F-336 covering a hot poured sealing compound; as well as Civil Aeronautics Association Specifications No. P-605

VICTORY PARA-PLASTIC bonds firmly with concrete, steel or wood, and serves as a joint or crevice sealer against infiltration of water. This material is not affected by ordinary extremes of summer or winter weather.

Specify VICTORY PARA-PLASTIC Hot-Poured Rubber-Like Sealing Compound as your water proof protection in general construction.

EXPANSION JOINTS

Servicised also is the only manufacturer of four different available types of Expansion Joints known as Asphalt Joint, Fiber Joint, Cork Joint and Self-Expanding Cork Joint. These Expansion Joints are extensively used in construction of Airport Runways, Highways, Tunnels, Bridges, Dams and other construction.

SEWER PIPE JOINTING COMPOUNDS

In addition, Servicised manufactures several types of waterproof Sewer Pipe Jointing materials namely; TUFFLEX—a cold premixed (adhesive and cohesive) plastic troweling compound;—HOT-POURED COMPOUND—for vitrified clay pipe; and PREMOULDED SEWER PIPE BELT—a belt shaped material that is calked between bell and spigot of sewer pipes.

ENGINEERS:

Additional information and Specifications on any of the above products will be furnished you upon request.

SERVICISED

SERVICISED PRODUCTS CORP.

6051 West 65th Street, Chicago, Ill.

Mounted on a trailer are a standard Type Y-M reclaimer, a diesel electric generator, clean oil storage tank, fuel oil tank and waterproof storage bins. In operation, a charging pump conveys the dirty oil from drums on the ground to the heating tank, where it is brought to a temperature sufficient to dissipate the volatiles. Thermostats control the heating process, and when the proper temperature is reached, the oil is dropped into transfer tanks, forced through a two-stage filter by compressed air, and on to clean oil receiving tanks.

The reclaimers are built in eight sizes and will purify many types of dirty oil.—*Youngstown Miller Co., Sandusky, Ohio.*

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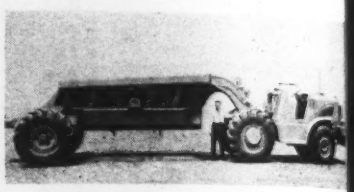


Bottom-Dump Trailer Wagon

Designed for use in building military highways, a new bottom-dump trailer wagon is 36 ft. long. According to the manufacturer's statement, this trailer is capable of handling 25-ton loads.—*The Heil Co., Milwaukee, Wis.*

• • •

Movable Partitions

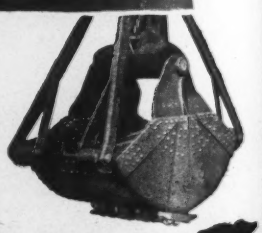
Interchangeable and demountable, new wood partitions are said to save both time and labor in erecting or rearranging office quarters. Glass and solid panels are available, for vision or privacy, as desired.

These partitions come in heights of 7 ft., 9 ft. and 10 ft. 6 in. They are M-P "Steelike" finished.—*Martin-Parry Corp., York, Pa.*

STAUNCH

Through demonstrated dependability servicemen have come to place implicit confidence in the ever faithful and efficient American Red Cross.

Through long demonstrated performance, too, bucket users have come to depend with confidence upon Owen Buckets as the most rugged and dependable units available to meet their various important requirements.



THE OWEN BUCKET CO.

BREAKWATER AVE., CLEVELAND, O.

BRANCHES: New York, Philadelphia, Chicago, Berkeley, Cal.

OWEN BUCKETS

MANUFACTURERS' ACTIVITIES

F. SCHIELE, who recently resigned as es manager and director of the Massey-rris Co., Racine, Wis., has joined the es department of the J. I. Case Co. at cine to serve as contact man with nches and dealers.

ANK P. HOOVER, formerly district sales nager of the Monarch Cement Co., of chita, Kan., has been appointed assist-sales manager with headquarters at mboldt, Kan. Mr. Hoover is succeeded Wichita by M. H. Miller, of Tulsa, la.

ALFRED M. STREET has been appointed blicity manager of Jenkins Bros., man-cturers of valves.

his new capacity will direct the vertising of all company's prod-ts. Mr. Street has en associated with kins Bros. for past 12 years, t in Bridgeport, nn., where the nt is located, and the past seven years in the New York ces at 80 White St. He was formerly istant publicity manager. In his new sition he succeeds Charles C. Cham-lain, who has been made general sales nager.

THUR W. HERRINGTON, board chair-n of Marmon-rrington Co., Inc., dianapolis, Ind., Oct. 2 received honorary degree doctor of engi-ering from the se Polytechnic titute at Terre ute, Ind., in rec-nition of his hievements in the d of military transportation.

He made an address on the subject, he Engineer's Part in Postwar Indus-," at the institute's commencement ex-ises.

W. BROCK, formerly service manager Genesee Tool Co., Benton, Mich., is representing that company as service es manager of a newly opened factory nch office at 1409 Central Life Insur-e Bldg., Cincinnati, Ohio. The move n recognition of the great industrial

HE CALLS HIMSELF SUPERWORKER, BUT I REALLY THINK IT'S THOSE EMPIRE BOLTS AND NUTS THAT ARE RESPONSIBLE FOR THE FAST ASSEMBLY WORK.

EMPIRE COLD-HEADED BOLTS*

STRONGER—Close-grained metal used; grain structure intensified by bolt-making processes and heat treatment.

TOUGHER—Cold-reduction of shank toughens skin surface for threading.

CLEANER—Threads *cold-worked;* strong, accurate, clean for quick assembly.

QUICKER—Point chamfered (60°) for ease in assembly.

*Up to ⅞" x 8"; larger sizes manufactured by another method.

EMPIRE NUTS*

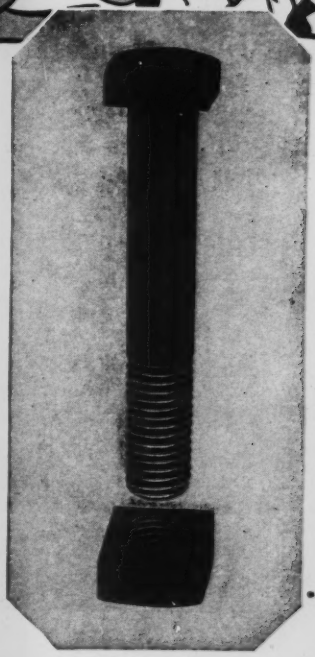
STRONGER—Hole is punched at *right angles* to grain — no splitting.

TOUGHER—Processed to guard against stripped threads.

CLEANER—Tapping is done with frequently-changed taps.

QUICKER—Accurate tapping means nuts run on fast; counter-boring of hole means quick get-away.

*Regular nuts are processed cold through ⅞".



EMPIRE and allied fastening products since 1845

RB&W—Making strong the things that make America strong

RUSSELL, BURDSALL & WARD BOLT & NUT COMPANY

Factories at Port Chester, N. Y., Rock Falls, Ill., Coraopolis, Pa.

Sales offices at Philadelphia, Chicago, Detroit, Chattanooga, Los Angeles, Portland, Seattle

WILLIAMS Buckets

BUILT BY WELLMAN

MULTIPLE ROPE AND POWER ARM
• POWER WHEEL • DREDGING
• STEEL MILL • DRAG-
LINE BUCKETS
⅜ to 10½ yds.
capacities

BUILT TO LAST—

Welded Rolled Steel Construction
Means Great Strength and Longer Wear!

and MOVE DIRT FAST

Williams Buckets are balanced and designed for digging power and fast action. An operator can make time with a Williams Clamshell or Dragline.

Send for free bulletin covering types of buckets for your particular requirements. It shows details of design and many exclusive features that clearly prove why your next bucket should be a Williams.

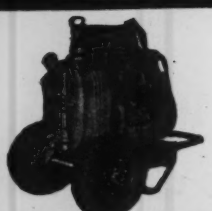
THE WELLMAN ENGINEERING CO.
7000 Central Ave.,
Cleveland, O.

STERLING QUALITY

STERLING
PUMPS

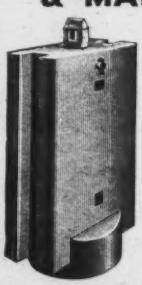
YOU'LL GET BETTER RESULTS WITH STERLING

WRITE FOR LITERATURE



STERLING
MACHINERY CORP.
405-13 Southwest Blvd. Kansas City, Mo.

DOBBIE FOUNDRY & MACHINE CO



Pile
Driver
Hammers

Weights 1000 to 8000 lbs.
Submit Load Dimensions

NIAGARA FALLS, N. Y.

development in the southern Ohio and northern Kentucky areas since the beginning of the war.

LUTHER H. ATKINSON has been appointed vice president in charge of sales of the Elastic Stop Nut Corp. of America. Mr. Atkinson was formerly vice-president in charge of marketing for the Weyerhaeuser Sales Co., St. Paul, Minn.

M. N. TRAINER has been elected vice president of the American Brake Shoe Co., New York. Mr Trainer has been president of the company's Brake Shoe and Castings Division since 1939. He will continue as president of that division. He is a graduate of the University of Pennsylvania, 1910, and joined Brake Shoe in 1916. He has been in both the sales and sales engineering departments and in 1926 was made vice president of American Malleable Co. and also of the American Brake Materials Co. In this latter position Mr. Trainer devoted his attention to adapting the company's long experience in railroad braking to the development of brake materials for the automotive industry.

M. A. Moynihan has retired as secretary and treasurer of the Gemmer Mfg. Co., 6400 Mt. Elliott Ave., Detroit, Mich., after 36½ years of service in various capacities. He was one of the founders of the business. Successors to Mr. Moynihan are George E. Trimm, former assistant secretary and assistant treasurer, who becomes treasurer; and Edward P. Hammond, Jr., who becomes secretary. Charles F. Hammond, Jr., formerly experimental engineer, is now vice-president in charge of engineering; Frank E. Phillips, formerly assistant sales manager and export sales manager, becomes vice-president in charge of sales.

LE ROI CO., Milwaukee, Wis., has announced the appointment of John M. Dolan as general sales manager. Mr. Dolan, who assumed his duties on Oct. 4, has a background of long experience in the machinery sales field. After being graduated from the Northwestern University School of Engineering in 1927, he joined the Dryden Rubber Co. in Chicago. Later he became associated with the Sullivan Machinery Co. in the general

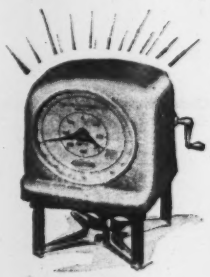
sales division. After this he was assistant to the general manager of the Western plant of that company. For the past five years he has been manager of the Sullivan Compressor Division, supervising both engineering and sales.

CUTLER-HAMMER, INC., of Milwaukee, Wis., has announced the appointment of W. E. Addicks as manager of its New York district office. He will have supervision of sales in that territory. He came to the company as an engineer immediately after graduation from Cornell University in 1914, and for ten years served as chief engineer at the New York works. He has recently been in charge of the Boston sales office. A number of patents are to his credit, and he has also been active in industrial educational work.

The company has also announced the appointment of C. V. Topliffe as manager of the Boston district office. Mr. Topliffe started with the company in 1924 after graduation from Cornell. His experience has been extensive in dealing with motor control, clutches, brakes, lifting magnets, appliance switches, etc

RICHARD P. BROWN, chairman of the board of the Brown Instrument Co., and vice-president of Minneapolis-Honeywell Regulator Co., has been named deputy director of the War Production Board, Third Region. For the past 18 months Mr. Brown has been serving as regional consultant to the Defense Plant Corp., subsidiary to the RFC. Mr. Brown's new duties will include maintenance of maxi-

100 Tons
OF TAR CONCRETE
Per Hour • Every Hour



THE
"Brass Brain"
(FLUIDOMETER)

This automatic metering system saves time, materials — insures uniformity. For all types of plants.

H&B PLANT SPEEDS ROAD CONSTRUCTION AT BIG NAVAL TRAINING STATION

With this Hetherington & Berner plant, Dale Engineering Co. (Utica, Syracuse and Rochester, N. Y.) averaged 100 tons of tar concrete per hour—every hour—on a road construction job at the big Naval Training Station at Sampson, New York. When the work day was lengthened from 10 to 12 hours, the daily production was boosted to 1,300 tons. Four black top paving machines were kept busy handling the output of this one plant.

This production is typical of the way in which H & B plants are helping speed the construction and maintenance of roads and bases that are vital to Victory. Write for complete information on H & B portable and stationary asphalt plants. HETHERINGTON & BERNER INC., Indianapolis, Indiana.

IN CANADA: W. L. BALLENTINE CO.
380 Fleet St., West, TORONTO

Hetherington & Berner

STORAGE TANKS WITH PRE-STRESSED GUNITE

LOW COST per million gallons

Rapid Construction (Only one form needed)

Shot on with a Gun for Double Strength Concrete

Water Reservoirs, Sewage Tanks, Chemical Tanks
Write for Our Latest Bulletin

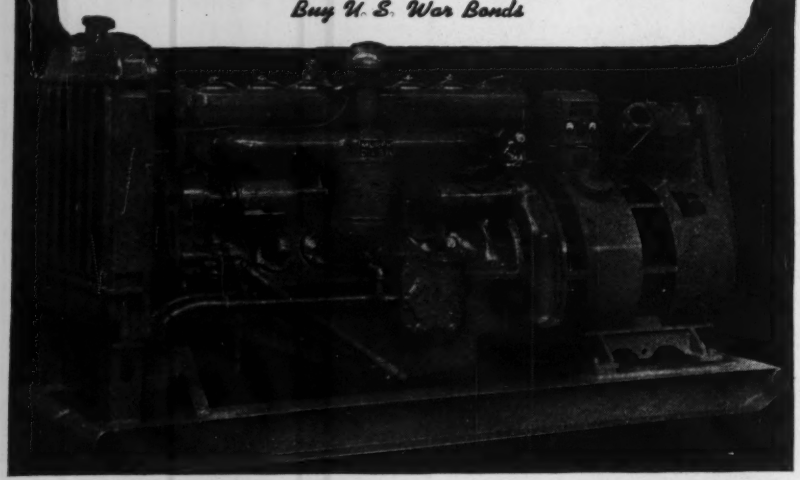
PRESSURE CONCRETE COMPANY
GUNITE Contractors & Engineers
No. 6 Avenue B, NEWARK, N. J. Phone Bigelow 8-1874

Depend on
MURPHY DIESEL
Reg. U.S. Pat. Off.
GENERATOR SETS
and ENGINES
for MORE POWER • MORE PROFITS

MURPHY DIESEL Generator Sets provide dependable power for continuous 'round-the-clock, heavy-duty service. Rugged, compact, simple to operate, these low-cost producers of power have won many friends through years of reliable service on a wide variety of installations. Put Murphy Diesel Engines and Generator Sets to work for you, for "More Power, More Profits."

GENERATOR sizes: 60 to 115 KW, AC or DC; ENGINE sizes: 90 to 215 HP. Write for complete information.

MURPHY DIESEL COMPANY, 5311 W. Burnham St., Milwaukee, Wis.
Buy U. S. War Bonds



mum production in plants engaged in war work and in coordinating efforts in the production drive of the Labor and Management Consultation Division of WPB in Pennsylvania, New Jersey, Delaware, Maryland and Virginia.

J. H. VON BEHREN, project engineer, Duquesne Works, Carnegie-Illinois Steel Corp., has been transferred to the staff of the chief engineer, Carnegie-Illinois Pittsburgh district. Gustave D. Erland, assistant project and presentation engineer, Defense Engineering Staff, Pittsburgh district, has been appointed assistant chief engineer at Duquesne. Frank Hovorka, project engineer, was transferred from Youngstown, Ohio, to Duquesne, Pa.

WORTHINGTON PUMP & MACHINERY CORP. has announced that Harry A. Erb has joined the organization as service manager of the Moore Steam Turbine Division, Wellsville, N. Y. A 1928 graduate of Cornell University, his experience covers the servicing of steam turbines, electric generators and all related equipment.

OPENING of a factory branch office to serve the Toledo, Ohio, industrial area has been announced by S. B. Hellstrom, general manager, Detroit Tap & Tool Co. The office is located at 1506 Toledo Trust Building. M. Teague and W. F. Haverstock are the local service engineers at the new branch office. The company has also recently considerably expanded its lines. It now produces tapping machines, tap reconditioners, and thread milling cutter checking equipment in addition to precision ground thread production tools and gages. Besides its main plant at 8432 Butler St., Detroit, Mich., it now also operates in Detroit what is said to be the country's largest plant devoted exclusively to the production of precision ground thread milling cutters.

ARTHUR C. RERICK, 50, vice-president of E. D. Etnyre & Co., Oregon, Ill., died in South Bend, Ind., recently. Often called the "Colonel", Mr. Rerick was well-known throughout the road-building in-

EPPINGER AND RUSSELL CO.
Wood Preservers Since 1878
All kinds of Structural Timbers and Lumber Pressure Treated with Creosote Oil or
DU PONT CZC Chromated Zinc Chloride
80 EIGHTH AVE., NEW YORK, N. Y.
POLES, CROSS ARMS, PILING, TIES POSTS, BRIDGE AND DOCK TIMBERS
TREATING PLANTS
Jacksonville, Fla. Norfolk, Va.
Long Island City, N. Y.

OHIO
LOCOMOTIVE CRANES

15 to 50 TONS CAPACITY
DIESEL • ELECTRIC • GASOLINE • STEAM
The OHIO LOCOMOTIVE CRANE CO.
BUCYRUS OHIO

Hayward Buckets

Use this Class "E" Clam Shell Bucket for handling crushed stone, gravel, sand and other bulk materials.
THE HAYWARD CO., 48-50 Church St., N. Y.

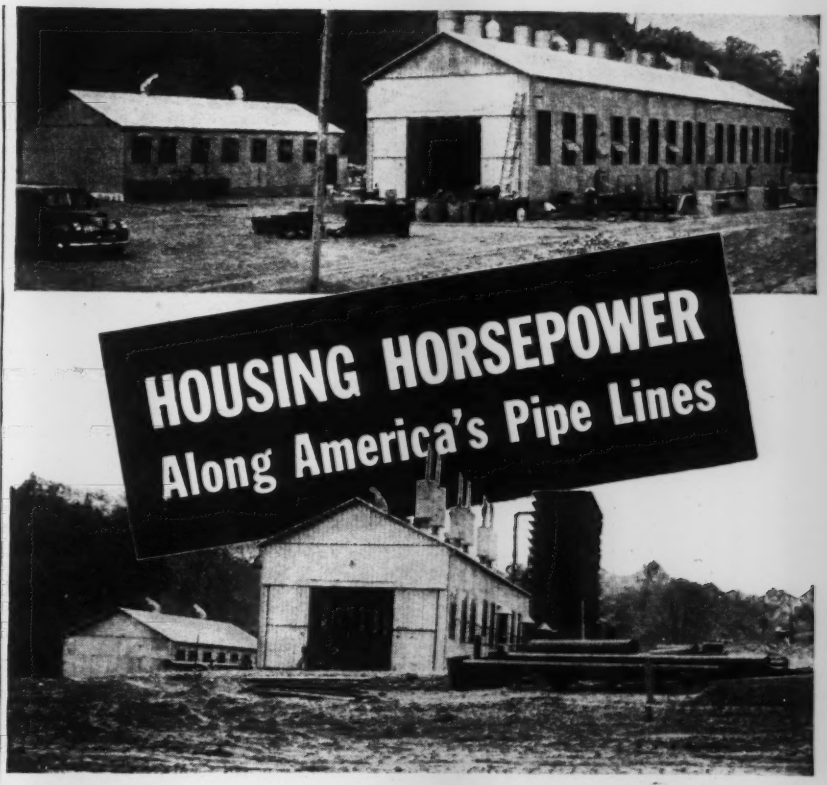
dustry as the factory representative of his company. At the time of his death, he was on leave of absence to help in the war effort as a member of the highway machinery division of the War Production Board. Having served at Washington during World War I, he answered the call for a second time in World War II and it was in Washington that the first attack occurred which ultimately resulted in his death.

R. H. McCORMICK has been appointed advertising manager of the American Hoist & Derrick Co., St. Paul, Minn. Previously he was advertising manager of the Vascolloy-Ramet Corp. at North Chicago, Ill.

LAWRENCE B. JACKSON has been appointed director of engineering, diesel division of the American Locomotive Co. He is a graduate of Stevens Institute of Technology. After association with the American Hawaiian S.S. Company as superintending engineer and with the Texas S. S. Company as plant engineer at the Bath, Maine, shipyard and superintendent of technical division, marine department, he went with Fairbanks Morse & Company in 1925. In that organization he advanced through the ranks from engineer, marine applications, to assistant chief engineer and chief engineer of the diesel division, manager, marine diesel sales, in Chicago, manager New England sales branch at Boston, to manager of engineering in 1936. Mr. Jackson has contributed to various technical journals on subjects relating to internal combustion engines and he is the inventor of an interlock hydraulic control for water gas manufacturing and an exhaust silencer.

THE JOHN W. STANG CORP. has opened a new branch at 215 S. W. Taylor St., Portland, 4, Ore. William Kauffman, who has been placed in charge of it, has had many years experience in dewatering and subsoil problems. This branch is in addition to those at San Diego, Calif., Houston, Tex., and New York City.

FRANK H. HARRISON, associated with International Harvester Co. for 30 years, most recently as manufacturing manager, has been made vice-president of Curtiss-Wright Corp. and temporarily will take over direction of operations at the firm's Columbus, Ohio, plant. Also elected a vice-president of the plane building firm was E. J. Harrington, coordinator of planning, production and materials problems for Lockheed Aircraft Corp. Mr. Harring-



Early in their development, when pipe lines were used for crude oil only, Butler Built Steel Buildings marked their cross country course. Today, the horsepower housed in steel buildings made in Butler factories is measured in the tens of thousands. At isolated sites on the growing pipe line network they protect millions of dollars worth of power pumping equipment which, in effect, moves distant oil and gas fields and refineries "next door" to centers of consumption.

In a score of other industries also, service records of Butler Built Steel Buildings date back more than 30 years. Factory fabricated for speedy, bolt-together erection, they lessen the overall investment. *Structurally strong, fire-safe, readily insulated, heated or air-conditioned*—they permanently house space for practically every type of operation. Their section-unit design makes them easily adaptable not only to present needs, but also to changing needs later.

Out of a vast production for lend-lease and war, many far-reaching improvements are emerging. Before you build, particularly any structure rated essential to the prosecution of the war, consult with Butler Engineers.

BUTLER MANUFACTURING CO.
KANSAS CITY 3 MO.
GALESBURG, ILL. MINNEAPOLIS 14, MINN.
Sales Offices—Washington, New York, Chicago, Atlanta and Shreveport
Export Office—8 So. Michigan, Chicago

BUTLER BUILT
☆ ☆ ☆ STEEL BUILDINGS ☆ ☆ ☆

MERCER

MERCER EQUIPMENT for the HANDLING of

BULKY • CASED • HEAVY

MATERIALS

Cranes, Elevators, Lift and Trailer Trucks, Conveyors, Live Skids, Drum Hoists, Winches, Tool Wagons, Carts.

WRITE FOR DETAILS

MERCER-ROBINSON COMPANY

INC.

30 CHURCH ST.

NEW YORK 7, N. Y.

ton is temporarily assigned to the Columbus plant but will go to the corporation's New York office in charge of all materials control. The new operations director during the last two years directed conversion of practically all International Harvester's plants into mass production of war materials. In 1941 he was made manager of the company's five tractor plants and in the same year was appointed manager of manufacturing.

CHARLES H. SYNARD, formerly chief engineer of William S. Lozier Corp. on construction of Seneca Ordnance Depot, is now with the Engineering Department, Associated Factory Mutual Fire Insurance Companies, 184 High St., Boston, Mass.

THE MICHIGAN TOOL CO. of Detroit is opening offices in Cleveland and Dayton, Ohio, to provide better service to gear producers. The Cleveland branch, in charge of George Pierce, district manager, will be located in the Penton Building. P. F. Zerkle has been appointed to direct sales activities of the company.

HENRY ORTH, superintendent of the Standard Tile Co. plant at Zanesville, Ohio, will be in charge of the Firestone Rubber Company's new plant to manufacture self-sealing gasoline tanks, which will occupy the tile plant property.

COLONIAL BROACH COMPANY, Detroit, Mich., has announced the opening of direct factory offices in South Bend, Ind., and Cincinnati, Ohio. T. S. Mellen has been placed in charge of the South Bend office at 601 Tower Building, while E. W. Brock will head the Cincinnati office at 1409 Union Central Insurance Co. building.

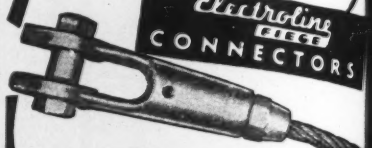
OFFICERS of the Timken Roller Bearing Co. have announced the appointment of Whitley B. Moore as director of sales for all divisions of the company, including industrial, automotive, railroad service-sales, steel and tube, and rock bit. He is to be succeeded in his former position of general manager of sales of the Timken Steel and Tube Division by C. H. McCollam.

R. H. RODOLF has been appointed manager of the pump and compressor division of the Gardner-Denver Co., Quincy, Ill., following the death of R. J. MacFarland. Mr. Rodolf's connection with the company dates back to August, 1917, when he joined the Canadian Rock Drill Co. at Vancouver, B. C., then a subsidiary of the Denver Rock Drill Mfg. Co. of Denver, Colo. Appointed as Mr. Rodolf's assistant is C. M. George, who joined the Gardner-Denver organization in Quincy in 1929. With the exception of a few months with the U. S. Army Engineers, Mr. George's

BUILT TO HANG ON

BECAUSE they have a special grip, Electroline-Fiege Wire Rope Connectors "hang on" under all conditions. The bite is tapered from rear to front. That dampens vibrations, thus preventing crystallization and fraying, gives you a positive connection and added rope life.

Electroline-Fiege connectors are safe (no molten metals to injure workmen or weaken wire rope,) streamlined, easy to install and economical. There are styles and sizes to fit every need. Write today for the interesting booklet, "Positive Grip". It is full of useful data.



Electroline FIEGE CONNECTORS

Electroline Company

4121 South La Salle Street Chicago, Illinois

UNION

EST. 1900 Union Iron Works, Inc. ELIZABETH, New Jersey

…ce with Gardner-Denver has been …inuous.

…OINTMENT of A. N. Morton, vice-…ident in charge of production for …k Mfg. Corp., as a member of the …sory committee for the automotive …n and tractor, liquid-cooled gasoline …ne industry, has been announced by … War Production Board. Mr. Morton … appointed production chief of the …ufacturing interests of Mack Trucks, … last February and recently became …-president and director of Mack Mfg. …p.

…ECTIVE at once, all Celotex gypsum …lding products will be distributed and …l under the new trade mark of "Celo-…k," according to an announcement by …ry W. Collins, vice-president in …rge of merchandising. Among the …ducts which will now be sold under …s name are anchor plaster, lath, liner …rd, sheathing, backer board, white …k wallboard, exterior wall units, in-…ior wall units, roof deck slabs, and …psum accessories.

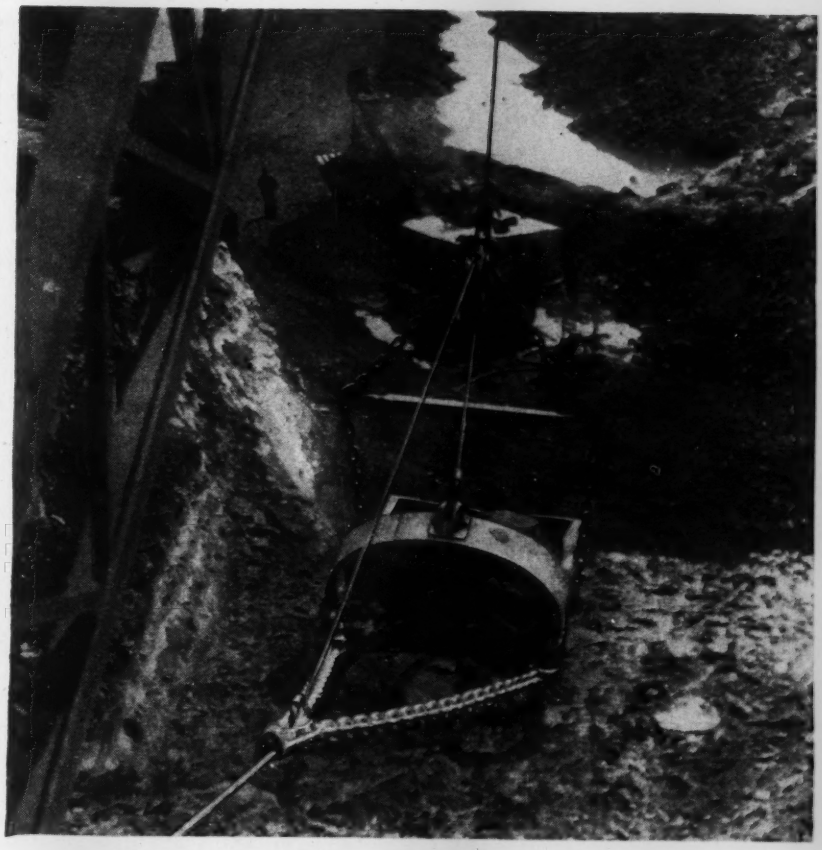
…E HOUSTON SHIPBUILDING CORP., …ouston, Tex., on September 27 was …warded three additional stars on its "M" …erit pennant.

…OCHRANE STEAM SPECIALTY CO., 80 Fed-…al St., Boston, Mass., has announced the …ddition of Joseph B. Grinnell to their …ganization. Mr. Grinnell is a former …sociate of the Whitty Mfg. Co., manu-…cturers of domestic and industrial …okers, and has also been connected with …e electrical staff of one of the large …my installations in New England.

…HE PORT HOUSTON IRON WORKS at …ouston, Tex., has purchased 8½ acres …f land on the Houston ship channel …here it will expand its plant.

FRANCIS MCADAM has rejoined the …chnical sales staff of the Dewey and …lmy Chemical Co., returning from the …ar Production Board, Building Ma-…erials Division, where he has been chief …f the non-metallic section controlling the …anufacture and distribution of port-…and cement, ready-mixed concrete, con-…rete products, sand and gravel, gypsum, …ock wool, insulating board, asphalt …oofing, and asphalt siding. Having …ompleted his task of increasing produc-…ion of concrete materials to meet the …mergency war construction program and …ssuring efficient distribution, Mr. Mc-Adam felt that he could properly resume …is former work.

CARLETON SMITH, economist and ob-…erver of foreign business and living con-…ditions, has been appointed assistant to the president of the Celotex Corp.



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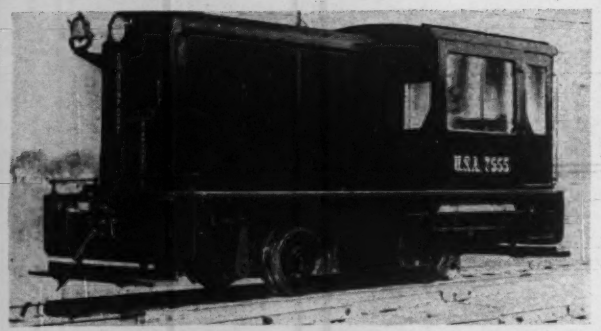

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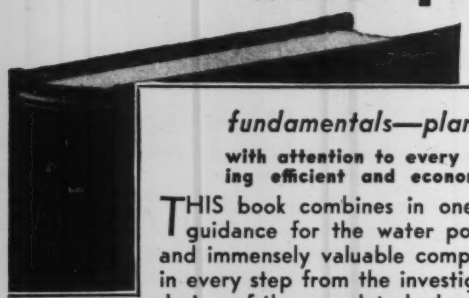

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THE STEVES SASH AND DOOR CO., of San Antonio, Tex., holders of a U. S. Maritime Commission prime joiner contract for 208 Liberty cargo ships being constructed at the Houston Shipbuilding Corporation's yard, was honored August 14 by the shipbuilding corporation at the launching of the seventy-ninth Liberty ship when Mrs. Herman Freeman, wife of the secretary of the Steves Sash and Door Co., sponsored the launching.

JOHN S. CHASE, president of the Chase Building Products Co., Dallas, Tex., has been made a member of the government's Ready-Mixed Concrete and Concrete Products Advisory Committee.

STUART J. SAKS, president of Morris Machine Works, Baldwinsville, N. Y., died recently.

THE UNION METAL MFG. CO., Canton, Ohio, peacetime manufacturers of steel street lighting standards, pile casings, Monotube poles, and materials handling equipment, has purchased the controlling stock of the Superior Switchboard and Devices Co. of Canton. Officers of the newly purchased firm are: President C. A. Orr, also president of the Union Metal Mfg. Co.; secretary, C. A. Streb, also secretary of Union Metal; treasurer and general manager, V. J. Lajeunesse, formerly manager of lighting sales for Union Metal.

THE ARMY-NAVY PRODUCTION AWARD was presented to the men and women of the J. D. Adams Mfg. Co. of Indianapolis, Ind., for excellence in war production on August 13 at the plant, 217 S. Belmont Ave., Indianapolis.

UNREPORTED in the South Pacific war zone since the fall of Manila, George S. Colley, Jr., vice president of W. A. Bechtel Co., 155 Sansome St., San Francisco, Calif., is now announced as alive and well on Borneo, although a Japanese prisoner. This news, transmitted through the International Red Cross, will be well received by his many friends in the petroleum and heavy construction industries following the long period of uncertainty. Mr. Colley has been identified prominently with the Bechtel organization's extensive pipeline construction activities, for many years having been executive in charge of this phase of the company's work. When war was declared he was engaged in building augmented naval and air facilities at Cavite on Man-

Bay, directing construction for his company as project manager under ocean-wide naval contracts being executed by Contractors Pacific Naval Air Bases. Both at Cavite and across the bay on the cliffs of Bataan peninsula the construction organization continued its work under constant attack until forced to capitulate.

WHITLEY B MOORE, veteran Timken Roller Bearing Co official Canton, Ohio, has been appointed director of sales for all the company divisions. He will be succeeded in his former position as general manager of sales for the steel and tube divisions by C. H. McCollam, assistant manager of the division since 1940.

GEORGE TALLMAN LADD, 72, president of the United Engineering & Foundry Co., Pittsburgh, Pa., died there Oct. 3. Last month the mechanical engineering department of Bucknell University was named for Mr. Ladd who was one of Pittsburgh's leading industrialists and engineers.

FRANK J. HOVORKA, engineer with the Carnegie-Illinois Steel Corp.'s Ohio works, Youngstown, Ohio, has been transferred to the corporation's Duquesne, Pa. works as project engineer. Hovorka joined Carnegie-Illinois at the Ohio works seven years ago. Carl Luth, acting and chief engineer at Duquesne, was made chief engineer and J. N. von Vehren, former project engineer at Duquesne works, was transferred to the staff of the chief engineer of the Pittsburgh district to handle special assignments.

THE ADVANCE PRESSURE CASTING, INC has announced the appointment of George A. Meyer as general sales manager The executive offices of the company, including sales, engineering, purchasing departments and technical laboratories are now located at 894 Manhattan Ave., Brooklyn, 22, N. Y.

TO TAKE CARE of the expansion of its services to industry, Denham & Co., 812 Book Building, Detroit, Mich., has added to its staff Darrell W. Drury, formerly electrical engineer in charge of industrial fluorescent lighting for the Detroit Edison Co., and Eugene W. Nelson, formerly metallurgist with the Timken-Detroit Axle Co., and recently with the Jam Handy organization, where he assisted in the preparation of industrial motion pictures and slide films for educational purposes

BURRELL S. MANUEL, Southern California district manager of the Westinghouse Electric Supply Co, with headquarters at Los Angeles, Calif., has been elected vice-president.

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There are three sound reasons why Naylor is the preferred pipe for push-pull ventilating service. It is light in weight. It is leaktight. And it is stronger, thanks to the exclusive Lockseam Spiralweld truss that runs the length of the pipe. Add to these advantages the practical savings of Naylor lightweight pipe and you can see why so many experienced operators depend on this distinctive pipe for permanent as well as temporary ventilating lines.

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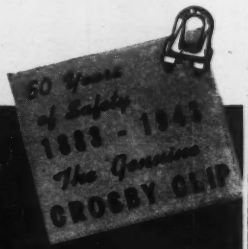

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Synthetic Rubber—How is synthetic rubber made? How does it compare with natural rubber? What is its future?—these questions are answered in a 44-page booklet entitled "Towers of Triumph."—*The Dayton Rubber Mfg. Co., Dayton, Ohio.*

Preventing Welding Fires—To instruct users of welding and cutting equipment in reducing potential fire losses, a convenient, 16-page, pocket-size booklet entitled "Preventing Welding and Cutting Fires." has been prepared. It contains brief, clear discussions of the chief causes of fires and gives practical measures for preventing them.—*International Acetylene Association, 30 E. 42 St., New York 17, N. Y.*

Industrial Paints—Heavy duty industrial maintenance paints are listed in a new catalog. Fully illustrated, it provides

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lication suggestions, product descrip- and technical data in complete de- The maintenance man or purchas- agent can plan his paint requirements know the characteristics of drying, erage and application by using this dy catalog.—*American-Marietta Co., E. Ohio St., Chicago 11, Ill.*

Liquid Level Control—In addition to cribing the primary equipment such as trodes, relays, etc., required for allation, there are listed in this 28- e catalog special controls and panels; automatic starter and relay combina- s, selector switches, special relays, erproof enclosures, and wiring dia- ms. These systems of liquid level trol are effective to within ¼-in. varia- s in any fluid that is an electrical con- tor.—*B/W Controller Corp., Birm- ham, Mich.*

bout Ball Bearings—A large port- o of bulletins on "Ball Bearing Prac- s for the Shop Man" is available. It tains a score or more of folders giving ass of practical information on this portant subject. The same corpora- puts out a ball bearing "Load Compu- on Manual" for engineers and design- —*Marlin-Rockwell Corp., Jamestown, Y.*

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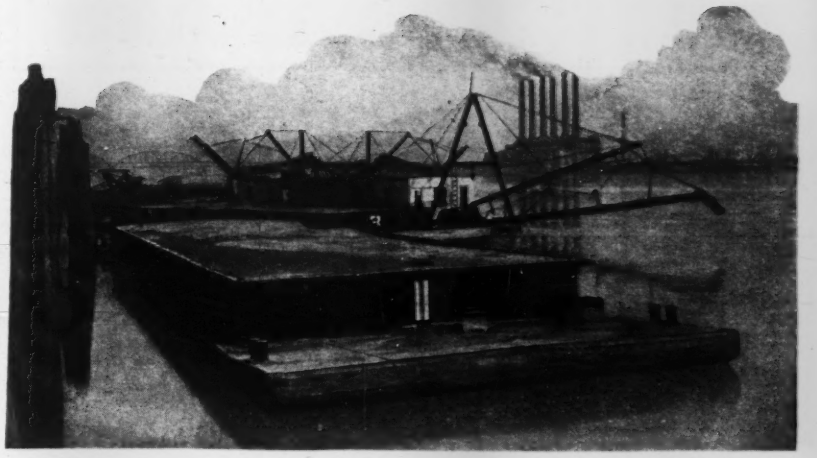

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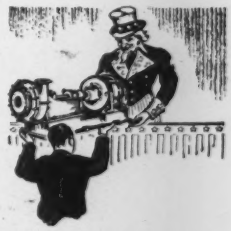
A 575-ton barge of sand loaded in 55 minutes . . . that's QUICK SAND production provided by a Morris 15-inch Hydraulic Dredge. In addition to speedy production, the operating and maintenance costs are remarkably low, too. One engineer, one pump man and assistant and one deck hand comprise the entire crew of the dredge which takes sand from the river bottom, screens the material and loads it onto barges. In a 9-hour day, the cost of fuel, lubricating oil and supplies is about $6; and total yearly repair costs, exclusive of lines and cables, were less than $30.

Speedy, economical sand and gravel production is characteristic of Morris Hydraulic Dredges. Whether your deposits are loose, gravelly, compacted or clayey, you can assure most effective operation with a Morris Dredge.

WE HAVE ENLISTED  "FOR THE DURATION"

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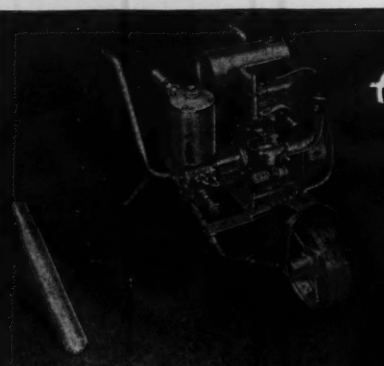

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special type of crusher used for crushing all types of ore, quarry rock or the coarse size in gravel pits, has been published. This crusher has been developed over many years of actual operation in a variety of materials in many parts of the world.—*Pioneer Engineering Works, Inc., 1515 Central Ave., Minneapolis, Minn.*

Metal Chilling—Authentic information has been made available on the important subject of cold treatment of metals in a new 24-page illustrated metal chilling data book offers the production man the latest information and technical data on the application of industrial chilling machines for the shrinking, testing, hardening and stabilization of metals.—*Dry-freeze, North Chicago, Ill.*

Fan Catalog—The manufacturer of a complete line of axial flow propeller-type fans and blowers has issued a catalog which features a new duct fan, designed for quick and economical duct mounting. Of particular value to engineers and factory officials concerned with ventilation and the cooling and drying of products are a number of pages devoted to formulas used in calculating air deliveries under various conditions.—*The Hartzell Propeller Fan Co., Piqua, Ohio*

Production Management—Methods of improving utilization of manpower resources and plant facilities through cooperation between management and labor are outlined in a booklet entitled "Production Management." The booklet gives a non-technical explanation of the production management methods employed in approximately 1,000 industrial plants in the United States and Canada.—*The Bedaux Co., Inc., 6300 Chrysler Building, New York, N. Y.*

Weekly Calendar—In accordance with recommendations from draftsmen and engineers a new calendar with 52 weekly sheets is being offered. Built on a week-to-week basis, the big black numerals can be easily read from any part of the drawing room. The over-all size is 15⅜ by 24⅓. A section of technical data for the engineer and drafteman is included containing charts on wire and sheet metal gages, screw threads, etc.—*The Frederick Post Company, Box 865, Chicago 90, Ill.*

Gasket Chart—A gasket chart showing the cross-sections of 36 most popular gasket types, their purposes and the characteristics which fit them for the specific services intended is now available to interested engineers. This chart was featured in the second issue of "The Gasket", compiled by the company's research laboratory.—*Goetze Gasket and Packing Company, Inc., New Brunswick, N. J.*

New Engineering Books

(*Continued from page* 116)

OODS—By Andrew D. Wood and omas G. Linn. 363 pp. The Chemical blishing Co., Brooklyn, N. Y. $4.

CTURAL FRAMEWORKS—By Clyde T. rris and Samuel T. Carpenter. 265 John Wiley & Sons, New York; apman & Hall, London. $4.

NING, 1943—Proceedings of annual eting of the American Society of nning Officials. 172 pp. Published by society at 1313 East 60th St., Chi- o. $2.

NT LAW—By Chester H. Biesterfeld. pp. John Wiley & Sons, Inc., New rk; Chapman & Hall, London. $2.75.

TARY CORRESPONDENCE AND REPORTS— A. C. Howell. 179 pp. McGraw-Hill ok Co., New York and London. $1.50.

RIPTIVE GEOMETRY FOR ENGINEERS— cond Edition. By Harry C. Bradley d Eugene H. Uhler. 261 pp. Interna- nal Textbook Co., Scranton. $2.50.

BLEMS IN DESCRIPTIVE GEOMETRY FOR GINEERS—By Eugene H. Uhler. Inter- tional Textbook Co., Scranton. $1.75.

LYSIS OF STATICALLY INDETERMINATE RUCTURES—By Clifford D. Williams. 2 pp. International Textbook Co., ranton. $3.50.

ER POWER ENGINEERING Third Edition By H. K. Barrows. 774 pp. McGraw- ill Book Co., New York & London. $6.

STRUCTION SPECIFICATIONS OF THE SPHALT INSTITUTE—258 pp. The sphalt Institute.

WPA AND FEDERAL RELIEF POLICY— Donald S. Howard. 862 pp. Russell ge Foundation, New York. $4.

NG STRESS CALCULATIONS SIMPLIFIED— S. W. Spielvogel. 79 pp. McGraw-Hill ok Co., New York and London. $2.50.

CIPLES OF HIGHWAY CONSTRUCTION AS PPLIED TO AIRPORTS FLIGHT STRIPS AND THER LANDING AREAS FOR AIRCRAFT— ne 1943. Public Roads Administration, ederal Works Agency. $1, from the perintendent of Documents, Washing- n, D. C.

Reports and Pamphlets

LDING MATERIALS AND STRUCTURES—Re- rt BMS97, Experimental Dry-Wall onstruction With Fiber Insulating oard, (10c.); Report BMS98, Physical roperties of Terrazzo Aggregates, 5c.); Report BMS99, Structural and eat-Transfer Properties of "Multiple ox-Girder Plywood Panels" for Walls, loors, and Roofs, (15c.); Report

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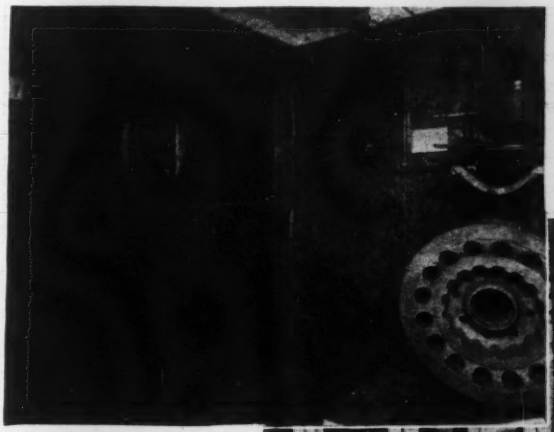
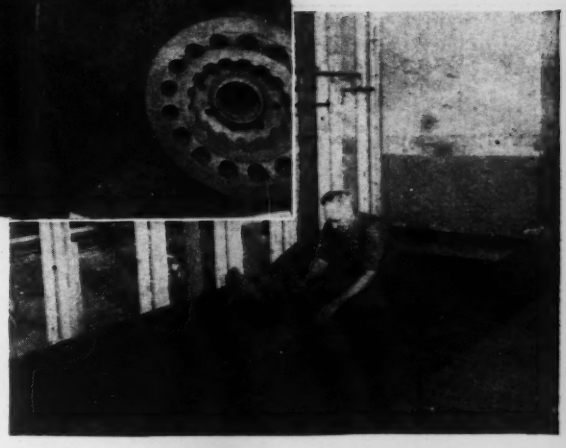


LEAD-lined X-ray room in industrial plant, where castings, forgings, and other materials are examined for flaws.



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BMS100, Relative Slipperiness of Floor and Deck Surfaces, (10c.); Report BMS101, Strength and Resistance to Corrosion of Ties for Cavity Walls, (10c.). Superintendent of Documents, Washington, D. C.

NEW METHODS FOR SIZE ANALYSIS OF SUSPENDED SEDIMENT SAMPLES—Report No. 7 of a Joint Study—U. S. Engineer Suboffice, Hydraulic Laboratory, University of Iowa, Iowa City.

SEWER SYSTEMS AND SEWAGE TREATMENT PLANTS IN THE CONTINENTAL UNITED STATES—First Annual Supplement—U. S. Public Health Service, Stream Pollution Investigations Station, Cincinnati, Ohio.

WATER TREATMENT PLANTS IN THE CONTINENTAL UNITED STATES—First Annual Supplement—U. S. Public Health Service, Stream Pollution Investigations Stations, Cincinnati, Ohio.

A GUIDE TO THE PREVENTION OF WEIGHT-LIFTING INJURIES—U. S. Department of Labor, Division of Labor Standards, Washington, D. C.

REPORT ON OHIO WATER TABLE SURVEY—Ohio Water Supply Board, Columbus, Ohio.

FREEWAYS FOR THE REGION—The Regional Planning Commission, Los Angeles, Calif.

1943 LAWS BULLETIN, A Digest of New Legislation Affecting Highway Users—National Highway Users Conference, Washington, D. C.

PROCEEDINGS OF THE SECOND HYDRAULIC CONFERENCE—Bulletin 27, State University of Iowa, Iowa City, Iowa. $1.65.

ADDENDUM TO SOME DATA IN REGARD TO FOUNDATIONS IN NEW ORLEANS AND VICINITY—Soil and Foundation Survey. State of Louisiana, Department of Public Works, New Orleans, La.

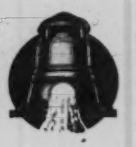
PATCHING CONCRETE PAVEMENTS WITH CONCRETE—No. 6: Wartime Road Problems. Highway Research Board, 2101 Constitution Ave., Washington, D. C.

THE STRUCTURAL DESIGN OF CONCRETE PAVEMENTS—A reprint of articles appearing in *Public Roads*. Public Roads Administration. Obtainable from the Superintendent of Documents, Washington, D. C. 40 cents.

MUNICIPALITIES AND THE POSTWAR—Special Committee on Planning of the American Municipal Association, 1313 East 60th St., Chicago.

ST. LOUIS—Annual Report of the Water Commissioner, Year ending April 12, 1943.

WATER—FOR SOME NINETY-MILLION PEOPLE



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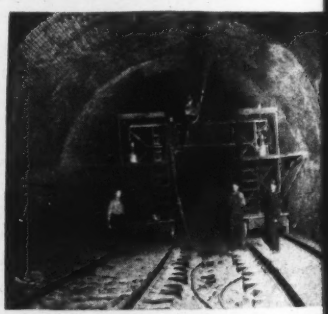

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MEN AND JOBS

Col. Robert Isham Randolph (A.U.S. ret.) has joined the staff of the Chicago Ordnance District, according to Brig. Gen. Thomas S. Hammond, district chief. In his new position, Col. Randolph will specialize in the field of contract terminations as a civilian assistant to Henry Isham, chief of the Ordnance District's purchasing, termination and renegotiation policy unit.

During World War I Col. Randolph commanded the 381st Engineers overseas. He was recalled to active duty as a colonel in 1941 and served as assistant chief of staff at the Seattle Port of Embarkation until being placed on the Army's inactive list in September, 1943.

Prominent in Chicago engineering circles for many years, Col. Randolph served as director of operations at the Century of Progress Exposition. He had charge of the construction of some of the bridges over the Chicago River, and, in 1940, served in a civilian capacity as chief engineer for the Constructing Quartermaster, 6th Zone.

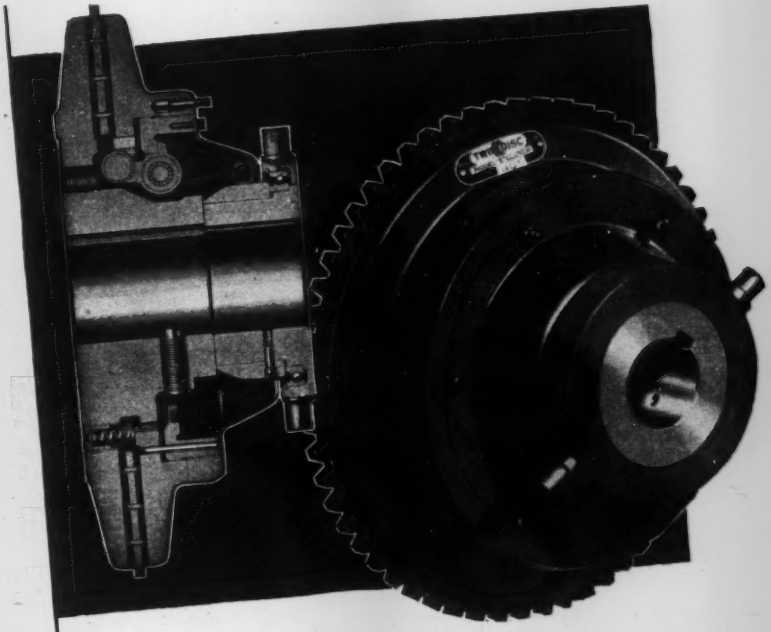
Resignation of **Frank R. Olmstead,** testing engineer for the Michigan state highway department, has been announced. He has gone with the Public Roads Administration, where he will be assigned to the testing of soils.

Charles Langlois has been appointed manager of the town of Sillery, Que. He was assistant district engineer with the Quebec Provincial Department of Roads.

David B. Baker, of Rich Square, N. C., who served as right-of-way engineer at Atlanta for the state highway board of Georgia prior to his enlistment in the U. S Naval Reserve, was recently cited by the commanding officer of the U. S. Naval Section Base at Mayport, Fla., for the designing, engineering and supervision of the construction of a baseball park and athletic field at the base

Joe H. Miller, head of the Construction Branch, Memphis, Tenn., District Engineers, has been appointed chief of operations for the district. He succeeds **Lt. Col. Garner W. Miller,** who was promoted to district engineer when Col Jarvis J. Bain retired

J. Fred Chapman, Sarasota, Fla., engineer, is the city's new commissioner of



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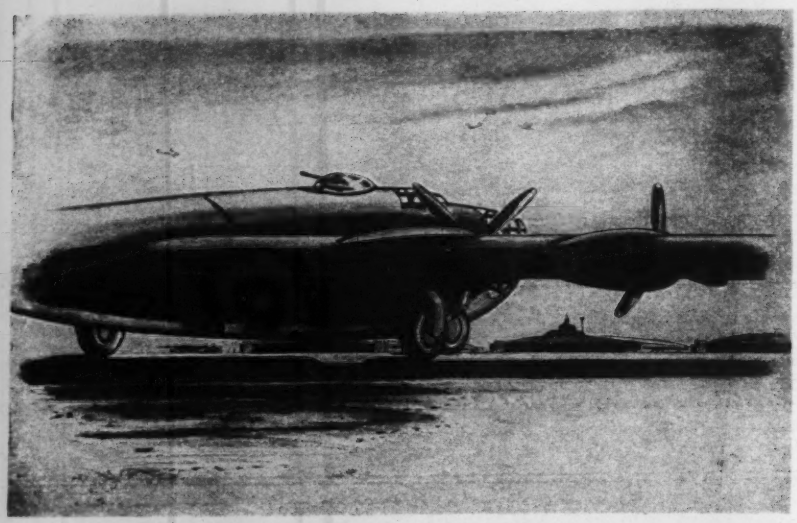

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public works. He succeeds E. H. Knight who has gone with the U. S. Army Engineers.

Maj. Harry L. Haverstick, in charge of construction at the Clinton County army airfield, Wilmington, Ohio, has been made project engineer in charge of construction of the $3,000,000 Signal Corps depot south of Dayton, Ohio.

Maj. Leonard A. White, Little Rock, Ark., consulting engineer, who has been area engineer at the Army and Navy Hospital, Hot Springs, Ark., and **Capt. Marshall A. Patch**, who has been at the Walnut Ridge Army Airfield as area engineer, have been transferred to duty at the Engineer School, Fort Belvoir, Va. **First Lt. Francis C. Baldwin**, of the Little Rock office of the Engineers, has also been transferred to Fort Belvoir.

Arthur J. Benline has recently been promoted to the rank of commander, Civil Engineer Corps, U.S.N.R., and is now overseas as offier-in-charge of the 70th Naval Construction Battalion. Commander Benline is on leave from his position as superintendent of the Department of Housing and Buildings, New York City. He also served as acting deputy commissioner of that department.

William H. Roberts, commissioner of public works for the city of Rochester, N. Y., since January 1938, has left for his new duties as chairman of the Board of Standards and Appeals, State Department of Labor, Albany, N. Y.

Lt. Stacy Q. Henley, former civil engineer for the city of Dallas, Tex., before entering the armed services, is finishing the last stage of his overseas training as an army air force navigator at the Army Air Base, Great Falls, Mont.

Lt. Col. Hal H. McCord, a Houston, Tex., structural engineer, has been made assistant chief of staff, in charge of personnel, for the Central Flying Training Command at Randolph Field, Houston.

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MEETINGS

INDUSTRIAL HYGIENE FOUNDATION, 8th annual meeting, Mellon Institute, Pittsburgh, Pa., Nov. 10-11.

THE PRODUCERS' COUNCIL, INC., 20th semi-annual meeting, Hotel Biltmore, New York, N. Y., Nov. 10-11.

HIGHWAY RESEARCH BOARD, 23rd annual meeting, Edgewater Beach Hotel, Chicago, Ill., Nov. 27-30.

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS, annual meeting, Chicago, Ill., Dec. 1-3.

JOINT MEETING, Society for Experimental Stress Analysis with Applied Mechanics Division, American Society of Mechanical Engineers, Hotel Pennsylvania, New York, N. Y., Dec. 2-4.

REGIONAL AND LOCAL MEETINGS

NEW JERSEY SECTION, AMERICAN WATER WORKS ASSOCIATION, fall meeting, Hotel Madison, Atlantic City, N. J., Nov. 4-6.

ASSOCIATED GENERAL CONTRACTORS of Massachusetts, Hotel Statler, Boston, Mass., Nov. 8.

NORTH DAKOTA RECLAMATION ASSOCIATION, third annual convention, Valley City, N D., Nov. 15

FLORIDA SECTION, AMERICAN WATER WORKS ASSOCIATION, 17th annual meeting and 2nd wartime conference, Governor's Club Hotel, Fort Lauderdale, Fla, Nov. 18-20.

CAROLINAS BRANCH, ASSOCIATED GENERAL CONTRACTORS, Pinehurst, N. C., Dec. 6-7.

NEW YORK STATE HIGHWAY CHAPTER, 18th annual "victory conference," DeWitt Clinton Hotel, Albany, N. Y., Dec. 8-9.

Elections and Activities

R. E. Parmalee, Helena, Ark., has been elected president of the Arkansas State Board of Registration for Professional Engineers, succeeding C. S. Christian, Little Rock. V. E. Scott, Little Rock, succeeded M. Z Bair, Little Rock, who has held post since the board was established in 1925.

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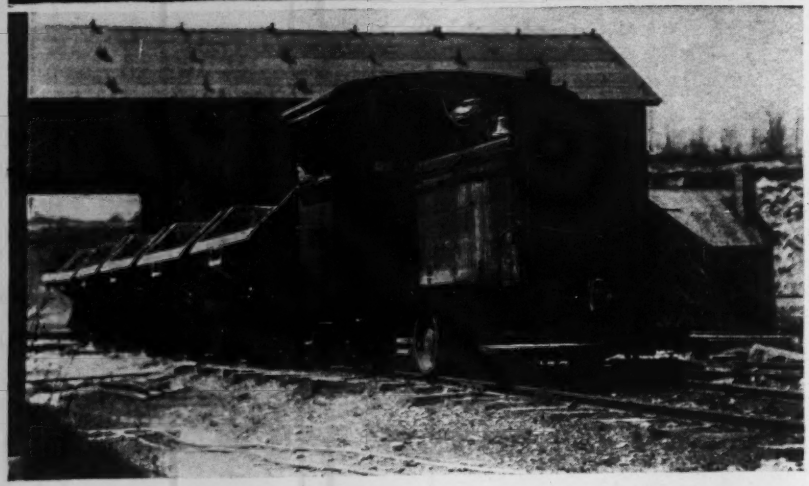

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Division of The Fate-Root-Heath Co. PLYMOUTH, OHIO, U. S. A.

A committee on postwar planning has been named by the Dallas Branch of the American Society of Civil Engineers, with F. K. Rader as its chairman. Rader is a professor of business administration at Southern Methodist University. Other members, from Dallas, are R. J. Gammie, G. F. Tongue, T. J. Controy, Cole Main, W. C. Whitman and I. W. Santry.

The St. John Art Club, of St. John, N. B., has re-elected A. R. Crookshank, a veteran civil engineer, as president. J. P. Mooney, another veteran civil engineer, was named treasurer. Mr. Crookshank, who is an oil painter as a hobby and has had his paintings shown at a number of exhibitions of art in St. John during the past 15 years, is on the engineering staff of the Canadian public works department, and attached to the St. John district base. Mr. Mooney, talented with pen and pencil and crayon, is a partner in the Mooney Construction Company, general contractors, St. John.

The Texas State Board of Registration of Professional Engineers has elected J. B. Thomas of Ft. Worth chairman of their board. He succeeded A. F. Mitchell of Corsicana, Tex. Other officers elected were E. W. Pittman of Beaumont, vice chairman; Carl L. Svenson of Lubbock, secretary, re-elected. Other members of the board are J. S. Hudnall of Tyle and Datus E. Proper of San Antonio.

Fred Paulson, president of the Master Builders Association of Iowa, has been selected to serve on the postwar planning committee of his home city, Cedar Rapids.

The Engineering Foundation at its recent annual meeting in New York City, re-elected A. L. Queneau, of the United States Steel Corporation, as chairman for the ensuing year. Kenneth H. Condit, Dean of Engineering, Princeton University, was elected vice chairman; Edwin H. Colpitts, formerly Director of the Bell Telephone Laboratories, was re-elected director, and John H. R. Arms, re-elected secretary.

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WATER SUPPLY

PROPOSED WORK

Mont., Great Falls—City, E. L. Shields, mayor, water storage tanks. $313,000. War Production Bd. rejected city's plan. CD 10/26—ENR 10/28.

R. I., North Kingston—Town, Water Works Comm., water sys., Belleville Sect., 1½ mi. transit pipe, 1 story 30x40 ft. water main pump. station, etc. $35,000. Jenks & Ballou, engrs. Industrial Trust Bldg., Providence, R. I. CD 1/5—ENR 1/7.

S. C., Charleston—St. Andrew's Pub. Serv. Dist. Comm., exten. city WW St. Andrew's Parish. J. McCrady, 9 State St., engr.

Tex., Leonard—L. S. Stallings, mayor, City Hall, $25,000 bond election Nov. 12, WW sys. CD 10/5—ENR 10/14.

Alta., Edmonton—Expanding water purification plant to 25 m.g. daily capacity, re-con. structure on wood piling, treatment plant consisting various flocculaters, clarifiers, carbonation chamber, divided settling basin and 4 filters. $900,000. R. C. Watson, City Hall. Power Plant supt.

BIDS ASKED

Bids Asked November 9

N. Y., New York—Comr. Water Supply, Gas & Electricity, Municipal Bldg., Zone 7, hauling, laying c.i. watermains, appurtenances and furnishing, installing steel air chamber and miscellaneous equip. at 179 St. pump. sta., Manhattan Boro. Plans deposit $1.

†**Massachusetts**—U. S. Eng., 31 St. James Ave., Boston, (selected list bidders), water sys. installing service mains, No. 19-023-44-Neg 102, Plymouth Co. $18,000.

Pennsylvania—H. C. Frick Coal & Coke Co., Frick Bldg., Pittsburgh, 3 story, 35x43 ft., brick water filtration plant, 1 m.g. daily capacity, Monongahela Twp., Greene Co. W. Housman, Frick Bldg., Pittsburgh, co. ch. engr.

CONTRACTS AWARDED

†**Arkansas**—U. S. Eng., 300 Bway., Little Rock, water treatment plant repairs, addns., installing sewerage main, etc., Contr. 03-050-Eng-36, Jefferson Co., to Peterson & MacFadyen, National Bank Bldg., Little Rock, $20,000.

†**California**—U. S. Eng., 751 S. Figueroa St., Los Angeles, Zone 14, water supply sys. addns., Contr. 04-353-Eng-34, Kern Co., to E. Green, 3301 Coolidge Ave., Los Angeles, $40,000.

†**Calif., LaJolla**—Federal Works Agency, Spreckles Bldg., San Diego, LaJolla Shores pipeline for water supply, Calif. 4-140, to E. G. Carroll, 2260 Main St., San Diego, $45,785. Bids 10/22, awarded 10/25.

Fla., Jacksonville—Exten. watermains in Cassett Ave., own forces, approx. $37,000.

†**Mich., Detroit**—Dpt. Water Supply, 735 Randolph St., 24 in. watermain, Contr. DM-S. Mich. 20-185, to C. Nelson, Royal Oak, $97,719. Bids 10/6. CD 9/29.

Man., Flin Flon—Hudson Bay Mining & Smelting Co. Ltd., 500 Royal Bank Bldg., Winnipeg, pump house, etc., day labor. $40,000. CD 10/28.

Ont., Oshawa — Municipality, watermain exten., etc., day labor, under supervision Pub. Utilities Comn., $25,000. J. Colvin, c/o owner, engr.

Que., Lauzon—L. Bourassa, municipality clk., filtration plant addn., to J. Dorval, 181 St. Joseph St., $40,000. Z. Langlois, 105 Mountain Hill, Quebec City, engr.

SEWERS, WASTE DISPOSAL

PROPOSED WORK

Calif., Hemet—Ryan School of Aeronautics, sanitary sewerage sys. Over $50,000. J. M. Montgomery & Co., 306 W. 3 St., Los Angeles, engrs.

Pa., Pittsburgh—Allegheny Co., pump station, sewers, Levi Bird Duff, County Office Bldg., co. engrs.

Tex., Houston—J. N. Edy, city mgr., City Hall, sanitary sewers in Lum Terrace, Golfcrest and Oak Acres also expansion Park Place Sewage Treatment Plant. $320,000. J. Fugate, city engr. CD 7/15—ENR 7/22.

Tex., Uvalde—Hangar 6, Inc., Uvalde, new outfall sewerage sys. $25,000. F. T. Drought, Frost Bldg., San Antonio, engr.

Ont., Collingwood—J. H. Fawcett, municipality clk., exten. sewerage sys. $30,000. Gore & Storrie, 1190 Bay St., Toronto, engrs.

Ont., Toronto—Pumping sludge from new sewage treatment plant to the North Toronto Plant for disposal purposes. $300,000. F. A. Dallyn, 21 King St. E., Toronto, engr.

Que., Almaville—J. C. Beaumier, municipality clk., sewer exten. $28,000.

Location of ENR Correspondents

Symbols and Abbreviations Include:

† Federal Government
★ Project of $500,000 or over
ENR Engineering News-Record
CD Engineering News-Record Construction Daily
A-E-M Architect-Engineer-Management type of contract

Projects—By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger: water supply, earthwork, waterworks, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

Classes of Construction

(Named in order of Listing)

Water Supply	Unclassified
Sewers, Waste Disposal	Latin America
Bridges	Public Buildings
Streets & Roads	Commercial Buildings
Earthwork, Waterways	Industrial Buildings

Stages Reported

PROPOSED: (except Streets & Roads):

BIDS ASKED (new announcements only. For full calendar, see also preceding issues of ENR):

LOW BIDDERS: On jobs below $500,000 value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.

CONTRACTS AWARDED: Except awards to low bidders previously reported in low bidder stage.

Dates shown are of issue in which last previous report was published.

Note: To comply with censorship requirements, addresses on some reports are being generalized. Data which would reveal the purpose of the improvements and the size are withheld. The name of contractor and general area are reported.

BIDS ASKED

Bids Asked November 8

N. Y., Brooklyn—President Brooklyn Boro., Boro. Hall, storm and sanitary sewers, Marine Parkway.

Bids Asked About November 11

†**La., Lafitte**—Jefferson Parish Sewage Dist. 1, sanitary sewer lines, pump and motor unit, lift station imprvs., etc. La. 16-244, $58,715. **FWA.** R. R. Steinwinder, 235 Carroltos, Metairie, engr. CD 10/14—ENR 10/21.

Bids Asked November 17

†**La., Metairie**—Sewer Bd., J. J. Holtgreve, genl. mgr. sewer imprvs., La. 16-244. $72,152. **FWA.** Plans deposit $25. R. R. Steinwinder, Metairie, engr.

†**Tex., West Columbia**—Federal Works Agency, Electric Bldg., Fort Worth, sewer imprvs., Tex. 41-606. Extended date. Plans deposit $25. Garrett Eng. Co., 1806 Milam St., Houston, engrs. CD 10/12—ENR 10/14.

Bids Asked

†**New Hampshire**—U. S. Eng., 31 St. James Ave., Boston, Mass., (selected list bidders), sewage disposal sys., No. 19-023-NEG 101, Hillsboro Co.

Ont., London—R. Garret, engr., City Hall, about 1,400 ft. 30 in. concrete sewer in Victoria St. from Richmond St. east of Wellington St., for City. $23,000. CD 8/25—ENR 9/2.

LOW BIDDERS

†**Conn., Bridgeport**—City Hy. Comn., City Hall, Oct. 25, Contr. 5, Johnson's Creek syphon and chambers for sewage expansion, Conn. 6-107, from Spearin, Preston & Barrows, Inc., 50 Church St., New York, N. Y., $37,725, **FWA.** CD 10/13.

CONTRACTS AWARDED

†**Florida**—U. S. Eng., Grant St. west of Westwood St., Mobile, Ala., sewage treatment plant addn., Contr. 569-eng-5448, Bay Co., to The E. M. Watkins Co., Tallahassee, $30,000.

†**Florida**—U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, drainage facilities, Dade Co., to W. T. Price Dredging Corp., 3200 S.W. 27 St., Miami, 33, approx. $70,000. Awarded 10/25.

†**Md., Annapolis**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., drainage sys. exten. completion, U. S. Naval Academy, NOY 6769, to J. L. Sullivan, 618 E. 34 St., Baltimore, $47,700.

†**New Jersey**—U. S. Eng., 120 Wall St., New York, 5, N. Y., sewerage sys., Somerset Co., to La Fera-Grecco Constr. Co., 149 Verona Ave., Newark, $50,000 plus.

†**Tex., Nederland**—H. C. Farris, mayor, City hall, sanitary sewers, Tex. 41-593 to H. B. Combs, Edinburg, $87,816. **FWA.** Chas. P. Smith, Box 684, Orange, engr. CD 8731—ENR 9/2 under LB.

Ont., Brockville—H. W. Carswell, city clk., Town Hall, 900 ft. 16 in. c.i. sewerage sys., laid to depth of 45 ft., in St. Lawrence River, to Canadian Dredge & Dock Co. Ltd., foot of Wellington St., Kingston. Est. $30,000. Bids 10/11. CD 10/1—ENR 10/7.

Que, Magog—Municipality, A. Girard, clk., sewers in several streets, to Canada Construction Co. Ltd., 548 W. King St., Sherbrooke. Est. $25,000.

BRIDGES

PROPOSED WORK

Louisiana—State Hy. Dpt., Baton Rouge, highway bridge to cross Bayou D'Inde, Calcasieu Parish.

★**N. Y., Buffalo**—City Dpt. P. Wks., City Hall, repairing, altering, reconstructing, imprv. 112 city-owned bridges. $500,000.

LOW BIDDERS

California—State Div. Hys., Sacramento, Oct. 27, repairing concrete bridge across Santa Ynez River, Santa Barbara Co., from D. Caputo, 985 Delmas Ave., San Jose, $60,507. CD 10/11——ENR 10/14.

★**Michigan**—State Hy. Dpt., Lansing, Oct. 20, 2 span 150 ft. railroad bridge, from W. J. Storen Constr Co., 2411 14 St., Detroit, $296,763; and Detroit Industrial Expressway and Pere Marquette Ry. grade separation structure for highway underpass, from L. A. Davidson, Lansing, $469,533, both Wayne Co. CD 10/12—ENR 10/14.

CONTRACTS AWARDED

Ont., Welland—Welland Co., rein. con. bridge, to Robb Contg. Co., Ltd., 7 Main St., Niagara Falls, Ont. R. J. Scott, County Bldg., engr.

Que., Montreal—C. A. Mongeau, city clk., reconstructing Ahuntsic bridge, to Concrete Constr. Ltd., 1082 Decarie Blvd., $39,300.

Que., St. Bruno—Municipality, c/o P. Baillargeon, clk., 130 Chambly Rd., Longueuil, bridge reconstruction, to Laflamme & Laflamme, Ltd., 8500 St. Hubert St., Montreal. Est. $25,000.

STREETS AND ROADS

BIDS ASKED

Bids Asked November 10

Fla., Jacksonville—City, City Hall, mixed-in-place surfacing on new stabilized existing base 2,029 sq. yd.; on stabilized existing hard-surface 5,839 sq. yd.; brick relaid on adjusted limerock surfacing 1,340 sq. yd.; mixed-in-place reconditioned surfacing, 2,900 sq. yd.; 560 lin. ft. curb reset. W. E. Shedden, city engr.

LOW BIDDERS

Conn., New Haven—City, Engr. Offices, Hall of Records, Oct. 26, asphaltic concrete on rein-con. paving River and James Sts. from Chapel to Ferry Sts., from New Haven Ready-Mix Concrete Co., 375 Mather St., Hamden, $62,355. R. J. Branner, asst. city engr. CD 10/19—ENR 10/21.

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STREETS AND ROADS (Low Bidders, Cont'd)

†D. C., Wash.—Pub. Rds., Admin., 16th Columbia Pike, Arlington, Va., Oct. 23, Proj. B-2, military hy., incl. bridges under Alabama Ave., from Troitino Constr. Co., Alexandria, Va., **$166,495.**

Mich., Pontiac—Oakland Co. Rd. Comm., bituminous surfacing 4.2 mi. 44 ft. pavement on west lane and 0.576 mi. on east lane of Woodward Ave., Birmingham to Ferndale, from Ann Arbor Constr. Co., Ann Arbor, **$98,423.**

CONTRACTS AWARDED

†Calif., Miramer—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., paved areas for motor vehicles, MCAD, NOY 7679, to Griffith Co., 1040 E. Bway., Los Angeles, **$41,150.**

Connecticut—State Hy. Comn., Hartford, imprv. Hartford Co., to White Oak Excavating, Inc., 59 East Main St., Rear, Plainville, **$31,**

†Illinois—U. S. Eng., 520 Merchandise Mart, Chicago, Ill., surfacing various roads, Madison Co., to Seneca Petroleum Co., Inc., 3256 S. Canal St., Chicago. Est. under **$100,000.**

Mich., Pontiac—Asphalt on concrete paving, widening sidewalk and gutter for widening project, to M. C. Whiteside, 2675 Orchard Lake Rd., **$26,434.**

†New Jersey—U. S. Eng., 6 and Walnut Sts., Phila., Pa., roads, Cumberland Co., to Spiniello Const. Co., 437 Riverside Ave., Newark, and Jos. Nesto & Co., 872 Bway., Newark, **$50,000.**

†New Jersey—Eclipse Aviation Corp., div. Bendix Aviation, Bendix, road paving, concrete parking areas, aprons, Bergen Co., to Mentes-Williams Co., 222 Madison Ave., Hasbrouck Heights. **$50,000.** Federally financed.

†New Mexico—U. S. Eng., Albuquerque, surfacing, Contr. 29-005-Eng-87, Curry Co., to Nolan Bros. Inc., 742 Metropolitan Bldg., Minneapolis, Minn., **$30,000.**

†Oklahoma—U. S. Eng., 231 W. Main St., Denison, Tex., constructing roads, Contr. 41-242-Eng-39, Comanche Co., to R. W. McKinney, Nacogdoches, Tex., **$90,000.**

†Va., Yorktown—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N. W., Wash., D. C., road construction, NMD, NOY 7136, to Virginia Asphalt Paving Co., Inc., P. O. Box 285, Petersburg, **$95,758.**

Wyoming—State Hy. Com., Cheyenne, Oct. 26, imprv. 24.954 mi. Sweetwater Co., to Island Constr. Co., 3867 Leavenworth St., Omaha, Neb., **$111,553.** Bids 10/26. Rejected bids Oct. 26, grading, draining, base course surfacing etc., 2 timber bridges, 0.795 mi. Teton Co., CD 10/20.

Man., Winnipeg — Municipality, concrete paving Martin Ave.; paving lane between St. Mathew and Wolever Aves., day labor, **$25,693.** W. R. Brereton, City Hall, engr.

Ont., Camp Borden—Dpt. National Defence for Air, Ottawa, Ont., resurfacing, drainage work at S.F.T.S. 1, to Brennan Paving Co. Ltd., 400 Gage St. N., Hamilton, **$245,000.**

Quebec—Dpt. Roads, Quebec City, earthwork, graveling 2 mi. North Hatley Rd., Ste. Catherine de Hatley, Stanstead Co., to Cormier, Ltd., 175 Alexandre St., Three Rivers, **$29,927;** 1.2 mi. St. Eloi Rd., Isle Verte, Riviere du Loup Co., to Eastern Canada Constr. Co. Ltd., 513 King St., Sherbrooke, **$69,049.**

EARTHWORK, WATERWAYS

PROPOSED WORK

†Arkansas—U. S. Eng., West Memphis, addnl. levees, revetments and embankments completing 45 mi. Missippi County sys. Over $25,000.

California—State Hy. Div., Sacramento, rejected bids Oct. 14, repairing flood control protection along Santa Clara River about 6 mi. east of Piru Creek, Ventura Co. CD 10/21—ENR 10/28, under LB.

Calif., Santa Monica—Bd. P. Wks., City Hall, dredging approx. 1,050,000 cu. yd. from Santa Monica Harbor and disposing same on beaches. Over $15,000. L. Aldrich, City Hall, engr.

Wis., Milwaukee—Soil erosion control at Lake Michigan and South Shore Park, incl. about 16,000 cu. yd. earth fill, 4,500 tons rock slabs, $40,000. J. P. Schwada, city engr.

Ont., Goderich—Canadian Pacific Ry. Co., J. E. Armstrong, ch. engr., Windsor Station, Montreal, Que., concrete retaining wall, $25,000.

CONTRACTS AWARDED

†California—U. S. Eng., 751 S. Figueroa St., Los Angeles, Zone 14, flood control sys., No. 231, Los Angeles Co., to Tomei Constr. Co., 4737 Orion Ave., Van Nuys, **$20,000-$30,000.** Awarded 10/16.

UNCLASSIFIED

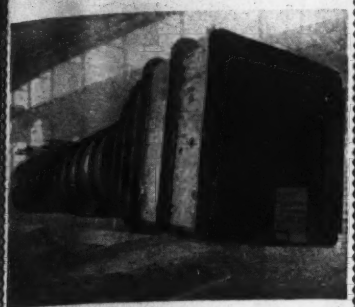
PROPOSED WORK

Louisiana—OIL WELL—Texas Co., 7300 San Jacinto, Houston, Tex., drilling, developing new 10,400 ft. test oil well, St. Charles Parish. Over $25,000.

Louisiana—GAS PIPELINE—The United Gas Pipe Line Co., 1515 Fairfield Ave., Shreveport, installing, maintaining 12 in. gas pipeline under and across Bayou Grand Caillou, Terrebonne Parish.

Louisiana—OIL PIPELINE—Standard Oil Co. of Louisiana, Standard Oil Bldg., Shreveport, 6 in. pipeline approx. 15 mi. southwesterly from Plaquemine, Iberville Parish.

PENSTOCKS



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UNCLASSIFIED (Proposed Work, Cont'd.)

Louisiana—OIL WELL—H. C. McCalman, et al, Shreveport, drilling, developing deep test oil well. $25,000.

Louisiana—OIL WELL, etc.—R. J. Montgomery, et al, Shreveport, developing new deep test oil well, storage, etc., Webster Parish. Over $25,000.

†**Maryland**—SHIPYARD BLDG.—Bethlehem-Fairfield Shipyards, 1201 Key Highway, Baltimore, soon lets contract 2 story, 42x112 ft., brick, frame outside machinists bldg. Federally financed.

†**Maryland**—SHIPYARD BLDG.—Bethlehem-Sparrows Point Shipyard, Sparrows Point, soon lets contract 2 story, 50x80 ft., reincon., brick mold storage bldg. $40,000. Federally financed.

★**Minn., Eveleth**—IMPROVEMENTS—City, A. L. Muhick, clk., imprvs., incl. drainage, grading, etc. Seeking $504,000 federal funds.

Minn., Duluth—STREET CAR RAIL REMOVAL—C. D. Jeronimus, city clk., rejected bids, removal street car rails and replacement paving. CD 10/20, under LB.

Minn., International Falls — IMPROVEMENTS—F. E. Patterson, city clk., City Hall, completing imprvs. Seeking $325,000 federal funds.

Neb., Beatrice—AIRPORT—C. M. Carpenter, city clk., City Hall, airport completion, $50,000. Applied to CAA. CD 4/14/42—ENR 4/16/42.

New York—UNLOADING PLATFORMS—Dpt. Parks, Arsenal Bldg., Central Park, 5 Ave. and 64 St., New York, bids soon unloading platforms, Richmond Co. $100,000. Waddell & Hardesty, 101 Park Ave., New York, engrs.

†**Oklahoma**—IMPROVEMENTS—U. S. Eng., 416 Wright Bldg., Tulsa, Zone 2, imprv., Sol. 34-066-44-13, Oklahoma Co. Over $25,000.

O., Cleveland — SITE DEVELOPMENT — Eastern States Homes, Inc., N. Preston, pres., A. Holzer vice pres., 32 W. 48 St., New York, N. Y., site development, street imprvs., grading, paving, sewer and water lines for 4 proposed housing. F. A. Thomas, 585 E. 222 St., Euclid, and Wight-O'Rourke Co., N.B.C. Bldg., engrs.

Pennsylvania—OIL WELLS, etc.—Williams Producing Co., R. Williams, mgr., Lewis Run, crude oil development properties, incl. drilling, unspecified number 1,800 ft. oil wells, connecting and gathering pipelines, steel tank storage facilities, pump. equip., etc., Corydon Twp., Warren Co. Over $40,000.

Texas—IMPROVEMENTS—U. S. Eng., 3 St. and Avenue F, Galveston, imprvs., facilities expansion, Harris Co.

†**Texas**—IMPROVEMENTS—U. S. Eng., 25 St. and Avenue F, Galveston, imprvs., seeding and grounds leveling, Sol. 41-243-44-C64, McLennan Co.

†**Texas** — IMPROVEMENTS — U. S. Eng., Fort Sam Houston, imprvs., bldg., Medina Co.

†**Texas**—IMPROVEMENTS—U. S. Eng., 25 St. and Avenue F, Galveston, imprvs., seeding and grounds leveling, Sol. 41-243-44-C67, Victoria Co.

Texas—OIL WELL—Dan Auld, et al, Milam Bldg., San Antonio, drilling, developing new ,000 ft. test oil well, Karnes Co. Over $25,000.

Texas—OIL WELL, etc.—Sun Oil Co., Esperson Bldg., Houston, drilling, casing, developing new 7,000 ft. test oil well, ground storage, Hidalgo Co. Over $25,000.

Tex., Afton—OIL WELL—Humble Oil & Refining Co., Humble Bldg., Houston, drilling, casing, developing new 7,500 ft. test oil well. Over $25,000.

Tex., Cayuga—OIL WELL—V. P. Mayer, et al, Palestine, drilling, developing new 6,000 ft. test oil well. $25,000.

Tex., Hamshire—OIL WELL, etc—G. H. McCarthy, et al., Sterling Bldg., Houston, drilling, casing, developing 9,500 ft. test oil well, earthern storage, etc. Over $25,000!

Tex., Seagraves—OIL WELL, etc—Samedan Oil Co., Seminole, drilling, developing 4,850 ft. test oil well, earthen storage, etc.

Tex., Taft—OIL WELL—Republic Natural Gas Co., Petroleum Bldg., Houston, drilling, casing, developing deep test oil or gas well. Over $25,000.

West Virginia—GAS PIPELINE CARRIER—Tennessee Gas & Transmission Co., Chattanooga Bank Bldg., Chattanooga, Tenn., subsidiary of Chicago Corp., 135 S. LaSalle St., Chicago, Ill., 72 mi. 8 in. natural gas pipeline carrier between Kenova and Charleston. $350,000.

B. C., Dewdney—WHARF, etc.—Stave Lake Cedar, Ltd., New Westminster, wharf, etc., in Nicomen Slough near here. $30,000.

B. C., Vancouver—PLANE TERMINUS—Canadian Pacific Air Lines Ltd., 620 Dominion Square Bldg., Montreal, Que., passenger plane terminus on waters between Piers C and D, Vancouver Harbour. $100,000.

B. C., Victoria—WHARF, etc.—International Pulp Wood Supply Co., Ltd., wharf, etc., in sub-division 119 Victoria City. $25,000.

Que., Drummondville—HEALTH CAMP—Health Camp of Comte de Falls, Inc., c/o Dr. J. M. Moron, 447 Lindsay St., health camp. $30,000.

Que., Mont Joli—IMPROVEMENTS—Dpt. Transport, Ottawa, Ont., imprvs., aerodrome development, incl. clearing, grading, etc., to LaCie de Constr. Lekoc, Ltd., Mont Joli, about $45,000. CD 5/27—ENR 6/3.

BIDS ASKED

Bids Asked November 10

†**Md., Salisbury**—CLEARING—Civil Aeronautics Admin., Administration Bldg., La Guardia Field, Jackson Heights, N. Y., clearing.

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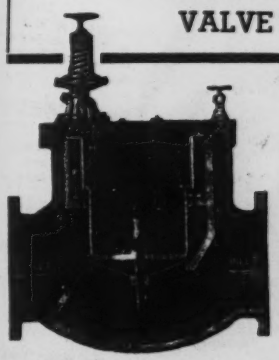

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UNCLASSIFIED (Bids Asked, Cont'd.)

Bids Asked About November 12

†**Louisiana**—IMPROVEMENTS—U. S. Eng., 25 St. and Avenue F, Galveston, Tex., imprvs., Sol. No. 41-243-44-C68, Orleans Parish. Over $25,000.

Bids Asked November 28

†**New Jersey** — IMPROVEMENTS — U. S. Eng., 120 Wall St., New York, 5, N. Y., imprvs., Essex Co.

Bids Asked About November 22

†**Okla., Pauls Valley**—AIRPORT—Dpt. Commerce, Civil Aeronautics Admin., P. O. Box 1689, Fort Worth, 1, Tex., airport, incl. paving runways and taxiways, grubbing, drainage, fencing seeding, grounds conditioning, etc. $475,000 or more. Plans deposit $20. CD 10/29.

Bids Asked

★**Texas** and **Oklahoma**—PIPELINE CARRIER—Stanolind Pipe Line Co., Fair Bldg., Fort Worth, Tex., and Philcade Bldg., Tulsa, Okla., 383 mi. 16 in. steel pipeline carrier from Levelland, Tex. to Drumwright, Okla. $6,500,000. CD 6/11—ENR 7/17.

★**Texas** and **West Virginia**—COMPRESSOR STATIONS—Tennessee Gas & Transmission Co., Chattanooga Bank Bldg., Chattanooga, Tenn. subsidiary of Chicago Corp., 135 S. LaSalle St., Chicago, Ill., 58,000 hp. compressor stations distributed between 5 stations having ten 1,000 hp. units and 1 station with eight 1,000 hp. units. $2,000,000. CD 9/27—ENR 9/30.

★†**Texas**—IMPROVEMENTS—U. S. Eng., 231 W. Main St., Denison, imprvs., facilities, Dallas Co. $6,800,000. CD 10/22—ENR 10/28.

LOW BIDDERS

Calif., Morrow Cove—SITE DEVELOPMENT—State Div. Architecture, Pub. Wks. Bldg., Sacramento, Oct. 26, site development, consisting mainly of earth excav., filling approx. 300,000 cu. yd., at Calif. Maritime Academy, from **A. Teichert & Son, Inc., Box 113**, Sacramento, **$90,765.** A. Boyd, state archt. CD 10/12—ENR 10/14.

★**Mass., East Boston (sta. Boston)**—AIRPORT IMPROVEMENTS—Commonwealth of Massachusetts, P. Wks., 100 Nashua St., Boston, Oct. 26, filling, dredging, General Logan Airport, from Atlantic Gulf & Pacific Co., 13 Park Row, New York, N. Y., **$6,020,000.** CD 10/5—ENR 10/7.

†**Texas**—IMPROVEMENTS—U. S. Eng., 231 W. Main St., Denison, imprvs., Grayson Co., from McKinney Constr. Co., Marshall, approx. **$30,000.**

†**Va., Gravelly Point**—AIRLINES OPERATIONS BUILDING, etc.—Pub. Bldgs. Admin., 18 and F Sts. N.W., Wash., D. C., Oct. 25, airlines operations bldg., from Eugene Simpson & Bro., Alexandria, **$28,832**; retaining wall, storage bldg., from E. L. Daniels Co., Arlington, **$27,460.** CD 10/19—ENR 10/21, under Public Bldgs.

CONTRACTS AWARDED

†**Alabama**—IMPROVEMENTS—U. S. Eng., Grant St., west of Westwood St., Mobile, imprvs., road surfacing, etc., Inv. 569-44-123, Calhoun Co., to Pitt Douglass & Lumine Constr. Co., Montgomery, **$40,000.** Bids 9/30.

†**Arkansas** — DAM — Aluminum Co. of America, Bauxite, 2,500 ft. earthen dam, 45 ft. high and 300 ft. concrete spillway to create water supply reservoir over 600 acres, to Morrison-Knudsen Constr. Co., 319 Bway., Boise, Ida. Defense Plant Corp. will finance.

†**Arkansas**—STEAM and AIR LINES—U. S. Eng., 300 Little Rock, installing steam and air lines, Jefferson Co., to E. W. Daniel Plbg. & Htg. Co., 114 E. 7 St., Little Rock, **$42,000.** Awarded 10/26.

†**California** — RAILROAD CLASSIFICATION YARD—U. S. Eng., 751 S. Figueroa St., Los Angeles, 611-car classification yard (railroad) No. 247, Los Angeles Co., to Shannahan Bros., 6193 Maywood Ave., Huntington Park, over **$25,000.**

†**Connecticut**—FACILITIES—U. S. Eng., 819 Industrial Trust Bldg., Providence, R. I., addnl. facilities, Contr. 37-018, Eng-68, Hartford Co., to D. A. Sullivan & Sons, Northampton, Mass., **$50,000.**

†**Florida**—FLIGHT HAZARDS REMOVAL—U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, flight hazards removal, Neg-Jax-44-252, Taylor Co., to J. B. Gibson Constr. Co., Donalsonville, approx. **$30,000.** Awarded 10/21.

†**Florida**—RUNWAY, etc.—U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, runway imprvs., end zones and approach zones, Neg-Jax-44-287, Hillsborough Co., to Cone Brothers Contg. Co., Caesar and Cumberland Rds., Tampa, approx. **$50,000.** Awarded 10/25.

†**Georgia**—FACILITIES—U. S. Eng., Post Office Bldg., Savannah, facilities, Contr. 819-Eng-1673, Liberty Co., to W. R. Cooper, 11 Ave, Columbus, **$40,000.**

†**Georgia**—GAS UTILITIES—Pub. Housing Auth., NHA, Temporary Bldg. 2, 19 and D Sts. N.W., Wash., D. C., gas utilities, to North American Utility & Constr. Corp., 415 Lexington Ave., New York, N. Y., **$112,000.**

†**Indiana**—HAZARD REMOVAL—U. S. Eng., 612 Federal Bldg., Louisville, Ky., removal of hazards, Contr. 15-029-Eng-64, Jackson Co., to Stuntz-Yeoman Co., Frankfort, **$30,000.**

†**Kansas**—GRADING, etc.—U. S. Eng., 10 E. 17 St., Kansas City, Mo., grading, graveling, constructing temporary frame bldg. and range, Contr. 23-028-Eng-142, Pratt Co., to List and Clark Constr. Co., Railway Exchange Bldg., Kansas City, Mo., **$40,000.**

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UNCLASSIFIED (Contracts Awarded, Cont'd.)

†Maryland—IMPROVEMENTS—U. S. Eng., 1 and Douglas Sts. N.W., Wash., D. C., imprvs., to McCloskey & Co., Suitland, $462,000. CD 10/12—ENR 9/16.

†Massachusetts—GRADING, etc.—U. S. Eng., 31 St. James Ave., Boston, grading, etc., No. 31-023-44-Neg-57, Suffolk Co., to C. J. Maney Co., Inc., 24 Dane St., Somerville. Est. $200,000. Bids 10/25. CD 10/22.

†Minn., Minneapolis—HANGAR TRUSSES—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., wood bowstring trusses for experimental hangar, Wold-Chamberlain Field, NOT 7517, to Timber Structures, Inc., P. O. Box 3782, Portland, Ore., $75,440.

†Nebraska—IMPROVEMENTS—U. S. Eng., 1709 Jackson St., Omaha, imprvs., bldgs., Scotts Bluff Co., to Korshoj-Beckenhauer, Blair. Est. under $50,000.

†New Jersey—TRACKS, etc—U. S. Eng., 120 Wall St., New York, 5, N. Y., tracks, paving roads, Essex Co., to Senior & Palmer, Inc., 50 Church St., New York, N. Y., $70,000. CD 10/12—ENR 10/14.

†New Jersey—FENCES—U. S. Eng., 120 Wall St., New York, 5, N. Y., fences, Somerset Co., to Cyclone Fence Co., 796 Frelinghuysen Ave., Newark, $50,000.

N. J., Bound Brook—RADIO STATION—National Broadcasting Co., 30 Rockefeller Plaza, New York, N. Y., construction and repairing radio station, to Skinner, Cook & Babcock, 60 E. 42 St., New York, N. Y., $100,000. A. Crosett, 512 5 Ave., New York, N. Y., engr.

†New Mexico — IMPROVEMENTS — U. S. Eng., Albuquerque, imprvs., bldg., Bernalillo Co., to K. L. House Constr. Co., Albuquerque, under $50,000. Awarded 10/24.

†New Mexico — IMPROVEMENTS — U. S. Eng., Albuquerque, imprvs., dust-palliative treating surfaces, Otero Co., to W. L. Denison, 121 7 St., Las Vegas, under $50,000. Awarded 10/24.

†Ohio — DRAINAGE, WATER and AIR PIPING, etc.—U. S. Eng., 700 Union Guardian Bldg., Detroit, 31, Mich., installing drainage, water and air piping, plumbing fixtures, fan units, sheet metal work for addnl. offices and shop space in hangar bldg., Cuyahoga Co., to Gorman-Lavelle Plumbing & Heating Co., 2241 E. 22 St., Cleveland; electrical work in above, to Hatfield Electric Co., 3855 Carnegie Ave., Cleveland.

†Oklahoma—DISMANTLING TANKS, etc.—U. S. Eng., 416 Wright Bldg., Tulsa, Zone 2, dismantling, transporting and re-erecting tanks (fuel and water), Sol. 957-Neg-44-81, Muskogee Co. to H. J. Happel & Co., 906 Manhattan Bldg., Muskogee, Okla., $33,200. Bids 10/4.

†Oklahoma—FACILITIES—U. S. Eng., 416 Wright Bldg., Tulsa, Zone 2, addnl. facilities, Contr. 34-066-Eng-34, Muskogee Co., to Ditmars-Dickmann Constr. Co., Muskogee, $40,000.

†Oklahoma—FACILITIES—U. S. Eng., 416 Wright Bldg., Tulsa, Zone 2, addnl. facilities, Sol. 957-neg-44-89, Muskogee Co., to Ditmars-Dickmann, Muskogee, $73,000. CD 10/6—ENR 10/14.

†Oklahoma—FIELD LEVELING, etc.—U. S. Eng., 231 W. Main St. Denison, Tex., addnl. facilities, incl. field leveling and some underground pipe, Comanche Co., to Bowers & Lundgren, 627 College St., Topeka, Kan., $32,000.

†Oklahoma—IMPROVEMENTS—U. S. Eng., 416 Wright Bldg., Tulsa, Zone 2, imprvs., turfing, Sol. 957-Neg-44-80, Garfield Co., to R. K. Lawson, Yukon, $68,000. CD 929—ENR 10/7.

†Oklahoma—IMPROVEMENTS—U. S. Eng., 416 Wright Bldg., Tulsa, Zone 2, imprvs., paving, Sol. 957-Neg-44-79, Oklahoma Co., to L. Sanders, Trades Natl. Bank Bldg., Oklahoma City, $58,000. CD 10/6—ENR 10/14.

†Oklahoma—IMPROVEMENTS—U. S. Eng., 416 Wright Bldg., Tulsa, Zone 2, imprvs., grading, drainage facilities, Tulsa Co. to Ottinger Bros., Braniff Bldg., Oklahoma City, $33,200. Bids 10/4.

†Oklahoma—IMPROVEMENTS—U. S. Eng., 416 Wright Bldg., Tulsa, Zone 2, imprvs., bldgs., facilities, Sol. 957-eng-44-87, Woodward Co., to Gilliog Constr. Co., Monett, Mo., $25,000. CD 10/16—ENR 10/14.

★Pennsylvania—HARBOR DEVELOPMENT and COAL TIPPLE—H. C. Frick Coal & Coke Co., Frick Bldg., Pittsburgh, harbor development, Monongahela Twp., Greene Co., to Dravo Corp., Neville Island. Soon lets contract coal handling tipple. Est. $5,500,000. CD 6/32—ENR 6/24.

†Rhode Island—IMPROVEMENTS—U. S. Eng., 819 Industrial Trust Bldg., Providence, imprvs., clearing land, No. 44-49, Newport Co., to Callan Constr. Co., 539 Hope St., Bristol. Est. under $50,000.

†Texas—IMPROVEMENTS—U. S. Eng., 416 Wright Bldg., Tulsa, 2, Okla., imprvs., bldgs., Sol. 957-Neg-44-76, Dallam Co., to Mefford-Davis Co., Enid, Okla., approx. $70,000. Awarded 10/21.

†Texas — IMPROVEMENTS — U. S. Eng., Fort Sam Houston, imprvs., grading, etc., Bexar Co., to Briggs & Killian, Sunset Rd., San Antonio, approx. $31,000.

†Texas—IMPROVEMENTS—U. S. Eng., Fort Sam Houston, imprvs., bldg., facilities, Howard Co., to Templeton & Cannon, 25 W. Beauregard St., San Angelo, $27,778. Bids 10/21. CD 10/15.

†Texas—IMPROVEMENTS—U. S. Eng., 25 St. and Avenue F, Galveston, imprvs., addnl. constr., Sol. 41-243-44-C57, Cameron Co., to H. B. Swedlund & Son, Harlingen, approx. $200,000.

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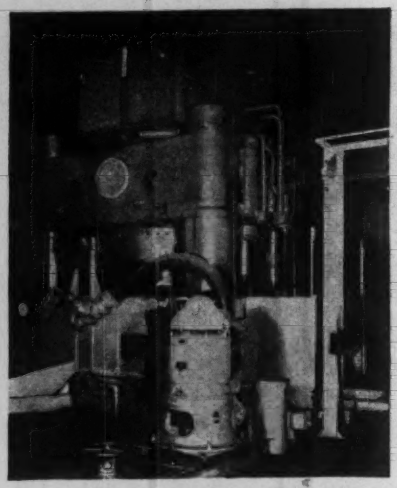

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A plant "converted" to make armor plate was all set for production. Operations of quenching and straightening the armor plate called for a large hydraulic press.

The press was regularly equipped with a pump of 1000 g. p. m. capacity working against 100 pounds pressure to force water through the upper and lower dies which are perforated. (It is necessary to mention that this pump was not of Deming make.)

When the press went into action for the first time, it was discovered that the capacity of the pump was inadequate to force water through all the perforations in the dies simultaneously. The obvious result was lack of uniformity in the quenching operation.

This critical situation forced the company to suspend all operations until the difficulty encountered in the quenching operation was overcome.

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At this point, The Deming Company received an urgent call for help. Deming engineers went into action. A careful check-up revealed that a pump of 2500 g. p. m. at 40 pounds pressure was required to produce uniform and adequate distribution of water through the perforations in the dies of the press.

The Deming Turbine Pump illustrated was ordered immediately. Shipped by express, The Deming Pump arrived and was installed in a few days from date of order.

The hydraulic press went into operation and a critical situation in armor plate production was averted. A voluntary letter from the customer states the Deming Turbine Pump operates perfectly, pumping plenty of water at plenty of pressure consistently.

Write for illustrated Bulletin 4700-8 on Deming Deep Well Turbine Pumps.

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UNCLASSIFIED (Contracts Awarded, Cont'd.)

†**Texas**—PARKING APRON—U. S. Eng., Albuquerque, N. M., parking apron expansion, Contr. 29-005-Eng-86, El Paso Co., to Austin Co., 1813 Clarence St., Dallas, **$300,000.**

Tex., Quitman—OIL WELL, etc.—R. Goldston, et al, Oil & Gas Bldg., Houston, drilling, casing, developing new 6,500 ft. test oil well, ground storage, etc., to Taubert & McKee, Petroleum Bldg., Fort Worth, **$30,000.**

†**Utah** — ELECTRICAL DISTRIBUTION SYSTEMS—U. S. Eng., 580 S. State St., Salt Lake City, electrical distr. sys., Weber Co., to Moore Electric Co., Atlas Bldg., Salt Lake City, less than **$30,000.**

†**Utah**—IMPROVEMENTS—U. S. Eng., 580 S. State St., Salt Lake City, imprvs., pump. sta., to Harrison-Dorman Co., 203 Interurban Depot, Salt Lake City, under **$15,000.** Bids 10/2.

†**Utah**—IMPROVEMENTS—U. S. Eng., 580 S. State St., Salt Lake City, imprvs., to R. J. Daum Constr. Co., 624 Beason Bldg., Salt Lake City, under **$95,000.** Bids 10/14.

†**Va., Yorktown** — RAILROAD — Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., railroad, NMD, NOY 7133, to Sutton Co., Inc., Radford, **$143,506.**

LATIN AMERICA

Chile—People's Home Savings Bank, Santiago (Caja de la Habitacion Popular), plans approx. 10,000 housing units annually for period of years, various locations in republic. Est. approx. $1,600 per unit.

Chile—Public Utilities Corp., Santiago, plans constructing over 500 dwellings, incl. sports stadium, medical center, school and other bldgs. for complete community center. $900,000.

Mexico—Federal Electricity Comn., Government Palace, Mexico City, plans hydro-electric plants, installing new generators, some repairs to existing plants in cities of Zumpimito, state of Michoacan, Bombana (Chiapas), Caracuaro (Michoacan), Ciudad Victoria, (Tamaulipas), Guernavaca (Morales), Vera Cruz, (State of Vera Cruz) and Amealco, (Guerrero). $921,275. Federal Government to pay half, states involved to pay half.

Mexico—Federal Govt., Government Palace, Mexico City, plans water sys., incl. road repairs, San Bartolo Naucalpan. $200,000.

Mexico—National Rys. of Mexico, (Ferrocarriles Nacionales de Mexico), L. Reina, ch. engr. M.W., 19 Bolivar St., Mexico City, plans concrete and steel railway bridge across Rio Panuco River, between Mexico City and Tampico. $100,000.

Mexico—National Rys. of Mexico, (Ferrocarriles Nacionales de Mexico), L. Reina, ch. engr. M.W., 19 Bolivar St., Mexico City, plans 70 mi. new steel rails and roadbed construction, grading, etc. between Mexico City and Tampico. $250,000.

Mexico—Federal Govt. (Health), Government Palace, Mexico City, plans new water sys. in Mezquital Valley, state of Hidalgo, for 35,000 inhabitants in 34 towns. $350,000.

Mexico—Federal Health Bd., Government Palace, Mexico City, plans stone, cement, steel hospital at **Huichapan**, $175,000; plans hospital in city of **Tulancingo**, $300,000; Federal Government and State (Federal Health Bd.), Government Palace, Mexico City, plan hospital at **Progreso**, $160,000, all foregoing in state of Hidalgo.

Mexico—Kansas City, Mexico & Oriente Ry., M. A. Camacho, pres., Mexico City, plans finishing railroad line about 260 kilometres between Creel, Chihuahua and San Pedro, Sinaloa, necessitating building a dam at San Jose and considerable mountain work, when completed entire road will be electrified. $1,200,000. Export-Import Bank of Washington, 811 Vermont Ave. N.W., Wash., D. C., U. S. A., will finance.

Mexico—Petroleos Mexicanos, et al., c/o E. Buenrostro, Mexico City, plans hi-octane gasoline refinery, 2,000 bbl. daily capacity refined project. $15,000,000. Arthur G. McKee Co., 2300 Chester Ave., Cleveland, O., U. S. A., engrs. CD 9/2—ENR 9/9.

Mexico—State of Chiapas, Municipal Palace, Tuxtla Gutierrez, Chiapas, will construct roads throughout city of Las Casas and vicinity, by own forces. **$100,000.**

Uruguay, Montevideo—Republic of Uruguay, Montevideo, plans construction and providing sanitation and health facilities, sewers, drainage, recreation facilities, health clinics, etc. $1,000,000.

PUBLIC BUILDINGS

PROPOSED WORK

†**Ala., Mobile**—Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta, Ga., plans by W. H. March, P. O. Box 813, 95 family dwelling units, Ala. 1218.

†**Calif., Alameda**—Pub. Bldg. Admin., 18 and F Sts. N.W., Wash., 25, D. C., plans by Franklin & Kump, 251 Kearney St., San Francisco, school facilities, incl. Unit. No. 1, 8 classroom school bldg., and Unit 2, 12 classroom school bldg., etc., Calif. 4543. $194,600. FWA.

†**Calif., Alameda**—Home Owners' Loan Corp., 1440 Bway., Oakland, Zone 12, plans by J. H. Meigs, 547 Simon St., Hayward, converting residence at 2050 Central Ave., into living units, Case No. W4D-137. $6,000.

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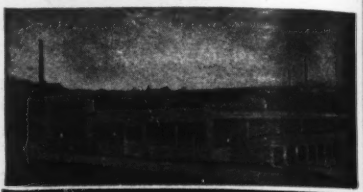

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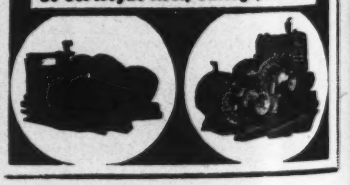

LIC BUILDINGS (Proposed Work, Cont'd.)

Alameda—Home Owners' Loan
1440 Bway., Oakland, Zone 12, plans
Reynolds & Chamberlain, 564 Market St.,
Francisco, converting bldg. at 1435 Stan-
St., into living units, Case No. W4D-120.
$5,000.

Alameda—Home Owners' Loan
1440 Bway., Oakland, Zone 12, plans
Reynolds & Chamberlain, 564 Market St.,
Francisco, converting bldg. at 1439 Stan-
St., into living units, Case No. W4D-119.
$5,000.

Alameda—Home Owners' Loan
1440 Broadway, Oakland, Zone 12,
by M. J. Marquis, 675 37 St., Oakland,
erting residence at 2161 Central Ave.,
living units, Case No. W4D-121. Over

Berkeley—Home Owners' Loan
1440 Bway., Oakland, Zone 12, plans
Reynolds & Chamberlain, 564 Market St.,
Francisco, converting bldg. at 1600 Dela-
St., into living units, Case No. W4B-812.
$5,000.

Berkeley—Home Owners' Loan
1440 Bway., Oakland, Zone 12, plans by
Whitehead, 5365 Bway., Oakland, con-
residence 2536 Piedmont Ave., into
units, Case No. W4B-1028. Over $5,000.

Blythe—Pub. Housing Auth., NHA,
Market St., San Francisco, 160 family
ling units, Calif. 4779.

Herlong—Pub. Housing Auth., NHA,
Market St., San Francisco, 300 family
ling units, Calif. 4794.

Los Angeles—Pub. Housing Auth.,
785 Market St., San Francisco, plans
Marsh, Smith & Powell, 816 Architects
Los Angeles, 1,000 family dwelling
Calif. 4775. CD 10/8—ENR 10/14.

Oakland—Home Owners' Loan
1440 Bway., Zone 12, plans by M. J.
quis, 675 37 St., converting bldg. at Lydia
West Sts., into living units, Case No.
34. Over $5,000.

Oakland—Home Owners' Loan
1440 Bway., Zone 12, plans by Reynolds
amberlain, 564 Market St., San Francisco,
erting bldg. at 1137 4 Ave., into living
Case No. W4B-475. Over $5,000.

Oakland—Home Owners' Loan
1440 Bway., Zone 12, plans by M. J.
quis, 565 37 St., converting bldg. at 600
son St., into living units, Case No. W4B-
Over $5,000.

Oakland—Home Owners' Loan
1440 Bway., Oakland, Zone 12, plans by
Reimers, 233 Post St., San Francisco,
erting bldg. at 248 29 St., into living
Case No. W4B-1033. Over $5,000.

Oakland—Home Owners' Loan
1440 Bway., Zone 12, plans by
Marquis, 675 37 St., converting bldg.
Oakland Ave., into living units, Case
W4B-1258. Over $5,000.

Oxnard—Pub. Housing Auth., NHA,
Market St., San Francisco, plans by
& Murphy, 116 E. Sola St., Santa
ara, 400 family dwelling units, Calif.
CD 10/20—ENR 10/28.

Richmond—Home Owners' Loan
1440 Bway., Oakland, Zone 12, plans
W. Jeans, 1824 San Pedro Ave., Berke-
converting bldg. at 534 Ohio Ave., into
units, Case No. W4B-1154. Over $5,000.

San Bernardino—Pub. Housing Auth.,
785 Market St., San Francisco, 100
dwelling units, Calif. 4769.

San Francisco — North Bay — Pub.
ing Auth., NHA, 785 Market St., San
cisco, 100 family dwelling units, Calif.
and 500 single person dwelling units,
4768.

South San Francisco—South San
cisco Unified School Dist., plans by
chard, Maher & Ward, 369 Pine St.,
Francisco, 7 classroom school bldg., store
., etc., Calif. 4552, $49,500. FWA.

Stratford—W. H. Shea, town mgr.,
Hall, plans by H. Beckwith, 115
St., Bridgeport, 2 story, bsmnt., brick
ney School Addn., Huntington Rd. FWA.
10/13—ENR 10/21.

Stratford—Wm. H. Shea, town mgr.,
Hall, plans by F. W. Beckwith, 115
St., Bridgeport, 2 story, bsmnt. school,
eve St. FWA. CD 8/23—ENR 8/26.

Trona—Pub. Housing Auth., NHA,
Market St., San Francisco, 100 family
ling units, Calif. 4793.

Waterbury—Pub. Housing Auth.,
24 School St., Boston, Mass., 60 trailers,
4329.

District of Columbia—Pub. Housing
., NHA, Temporary Bldg. 2, 19 and D
N.W., Wash., plans by Saarinen &
son, 2017 South St. N.W., Wash., family
ling units, DC 1-13.

District of Columbia—Pub. Housing Auth.,
Temporary Bldg. 2, 19 and D Sts. N.W.,
., plans by H. Klaber & A. P. Davis,
Connecticut Ave. N.W., Wash., family
ling units, DC 1-14. CD 10/7—ENR

., Panama City—Bay Co. School Bd.,
Hall, 22 room school, Michigan and Mag-
Sts. FWA. CD 5/7—ENR 5/13.

Idaho, Bayview—Pub. Housing Auth.,
Skinner Bldg., 5 Ave. and Union Sts.,
le, 1, Wash., plans by Whitehouse &
Hutton Bldg., Spokane, Wash., 60
family dwellings, Idaho 10110. CD 10/8
R 10/14.

Idaho, Pocatello—Pub. Housing Auth.,
Skinner Bldg., 5 Ave. and Union St.,
le, 1, Wash., 80 unit family dwellings,
10111; 100 unit trailer housing, Idaho

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TAPES • RULES • PRECISION TOOLS

PUBLIC BUILDINGS (Proposed Work, Cont'd.)

†Illinois—Pub. Housing Auth., NHA, 201 N. Wells St., Chicago, one family residences and converting existing units.

†Ia., Newton—Pub. Housing Auth., NHA, 201 N. Wells St., Chicago, Ill., 75 trailer housing, Ia. 13060.

★†Kansas—National Refining Co., Coffeyville, addnl. plant facilities $1,660,000. Defense Plant Corp. will finance.

†La., New Orleans—Pub. Housing Auth., NHA, 1205 Electric Bldg., 7 and Taylor Sts., Fort Worth, Tex., bids soon, 300 unit family housing La. 16099. Fromherz Associates, 226 Carondelet St., archts. CD 10/27—ENR 10/28.

†Me., Presque Isle—Pub. Housing Auth., NHA, 24 School St., Boston, Mass., 40 unit family dwellings, Me. 17084.

†Maryland—Maryland Drydock Co., Fairfield, plans by J. E. Greiner Co., engr.-archt., 1201 St. Paul St., Baltimore, 2 addnl. yard bldgs., 1 and 2 story frame. Federally financed.

†Md., Aberdeen—Pub. Housing Auth., NHA. Temporary Bldg. 2, 19 and D Sts., N.W., Wash., D. C., plans by F. L. W. Moehle, 312 Professional Bldg., Baltimore, 50 unit dormitory housing, Md. 18273.

†Md., Great Mills—St. Marys Co. Bd. Educ., Leonardtown, school adjacent to Great Mills High School, Md. 18-189. $180,527 FWA allot. J. J. Baldwin, 927 15 St. N.W., Wash., D. C., archt. CD 9/29—ENR 10/7.

†Mass., Dorchester (sta. Boston)—St. Mary's Infant Asylum and Lying-in Hospital, 90 Cushing Ave., plans by T. F. McDonough, 168 Dartmouth St., Boston, 2 story, brick, steel training school for nurses. $82,200. FWA.

★†Michigan—Mueller Brass Co., Port Huron, plant facilities. Approx. $1,500,000. Defense Plant Corp. will finance.

†Mich., Saginaw—Pub. Housing Auth., NHA, 2073 E. 9 St., Cleveland, O., 100 unit family dwellings, Mich. 20224.

★†Mississippi—General Tire & Rubber Co., 1708 E. Market St., Akron, O., synthetic rubber tire mfg. plant. $3,500,000. Federally financed.

†Miss., Gulfport—Federal Works Agency, 20 5 St., Atlanta, Ga., plans by V. B. Smith, Jr. and R. Bean, Gulfport, recreation bldg. $20,000.

†Neb., McCook—Pub. Housing Auth., NHA, 1006 Grand Ave., Kansas City, Mo., 200 unit family dwellings, Nebr. 25076.

†Neb., McCook—Pub. Housing Auth., NHA, Dierks Bldg., 1006 Grand Ave., Kansas City, Mo., 228 unit family dwellings.

†Nev., Reno—Pub. Housing Auth., NHA, 785 Market St., San Francisco, Calif., plans by DeLongchamps & O'Brien, 760 Market St., San Francisco, Calif., 100 family dwelling units, Nev. 26156 and 89 dormitory accommodations, Nev. 26157. CD 10/6—ENR 10/14.

†New Jersey—Eastern Aircraft, Parkway Ave., Trenton, bldg. $60,000. Defense Plant Corp. will finance.

†New Jersey—Chatham Engineering Co., Inc., Chatham, plant facilities. $40,000. Defense Plant Corp. will finance.

†N. M., Belen—Pub. Housing Auth., NHA, 1205 Electric Bldg., 7 and Taylor Sts., Fort Worth, Tex., 50 unit dormitory housing, N. M. 29170; 60 unit family dwelling housing, NM 29171.

†N. M., Las Vegas—Pub. Housing Auth., NHA, 1205 Electric Bldg., 7 and Taylor Sts., Forth Worth, Tex., 60 unit family dwellings. N.M. 29172.

†N. M., Vaughn—Pub. Housing Auth., NHA, 1205 Electric Bldg., 7 and Taylor Sts., Fort Worth, Tex., 50 unit dormitory housing, N.M. 29173; 20 unit family dwellings, N.M. 29174.

†N. C., Gastonia—Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta, Ga., 60 unit family dwellings, N.C. 31166.

†N. C., Jacksonville—Federal Works Agency, 601 State Planters Bank Bldg., Richmond, 19, Va., 2 schools, at Holly Ridge, other at Midway Park, near here. $50,400 allot.

†N. C., Monroe—Bd. Comrs. Union Co., J. R. Shute, chn., Monroe, health center $57,750. FWA. CD 10/29.

†Oklahoma—U. S. Eng., 231 W. Main St., Denison, Tex., housing, Carter Co. $150,000.

†Okla., Ponca City—Pub. Housing Auth., NHA, 1205 Electric Bldg., 7 and Taylor Sts., Fort Worth, Tex., 100 unit family dwellings. Okla. 34077.

★†Oregon—Columbia Metals Co., c/o Bonneville Auth., Exchange Bldg., Portland, alumina-from-clay plant, $6,000,000. Defense Plant Corp. allocated funds. CD 6/29—ENR 7/1.

†Pennsylvania—McCreary Tire & Rubber Co., Indiana, soon lets contract tire mfg. plant. $165,000. Defense Plant Corp. will finance. Plant & Machine Design Co., 1213 Majestic Bdg., Detroit, Mich., archts. CD 10/22—ENR 10/28.

†Pa., Pottstown—Pub. Housing Auth., NHA, 270 Bway., New York, 7, N. Y., plans by H. I. Eller, 147 N. 5 St., Reading and J. E. Mast 524 Court St., Reading, 160 unit family dwellings, Pa. 36440. CD 9/21—ENR 9/23.

†Pa., Sharon — Christian Buhl Hospital, Sharon, nurses home addn., Pa. 36-211. $105,725. FWA.

†S. D., Custer—Pub. Housing Auth., NHA, 201 N. Wells St., Chicago, Ill., 60 unit family dwellings, S.D. 29050.

†Tex., Beaumont-Port Arthur-Orange—Pub. Housing Auth., NHA, 1205 Electric Bldg., Seventh and Taylor Sts., Fort Worth, 80 family dwelling units, Tex. 41625.

Tex., Laredo—State Health Dpt., c/o G. Cox, Austin, health center, $43,700. Applied FWA funds.

†Tex., Sweetwater—Pub. Housing Au 1205 Electric Bldg., Seventh and Taylor Fort Worth, new bids soon, 40 family dw ing units, Tex. 41-613. No bid opening Oct. J. H. Hughes & F. C. Ol 316 Citizens tional Bank Bldg., Abilene, and Consolida Architects & Engineers, 41 Cappa Bldg., Fo Worth, archts. CD 10/12—ENR 10/14.

Tex., Waco—Baylor University, bid water, gas, sewerage sys., etc., incl. repa ments, expansion where necessary.

†Utah, Helper—Pub. Housing Auth., NH Dierks Bldg., 1006 Grand Ave., Kansas C Mo., 100 unit trailer housing, Utah 42170.

†Utah, Magna—Pub. Housing Auth., NH Dierks Bldg., 1006 Grand Ave., Kansas C Mo., 50 unit trailer housing, Utah 42171.

†Va., Denbigh—Federal Works Agen State Planters Bank Bldg., Richmond, Z 19, equipment storage shed, and addns county jail and fire station at Hilton V lage, Va. 44-338. Williams, Colle & Pip Newport News, archts.

†Va., Norfolk—Norfolk General Hospi Norfolk, addnl. living quarters and classro facilities for student nurses, Hampdin Bl Va. 44-343, $181,776. FWA.

†Wash., Keyport—Pub. Housing Au NHA, Skinner Bldg., 5 Ave. and Union Seattle, Zone 1, 200 unit family dwell Wash. 45246.

N. S., Digby—Municipality in Associa with Wartime Housing, Ltd., 55 York Toronto, Ont., surveys housing.

N. S., Sydney—Canadian Natl. Institute the Blind, H. C. Murphy, chn., Halifax, e cational and recreational centre for the bl covering Cape Breton Co. $150,000.

BIDS ASKED

Bids Asked After October 30

†Pa., Hatboro—Pub. Housing Auth., NH 270 Bway., New York, 7, N. Y., communi and commercial bldgs., Pa. 36251. Plans d posit $10. Silverman & Levy, 1700 Sans St., Phila., archts.

Bids Asked After November 2

†Pa., Williamsport—Pub. Housing Au NHA, 270 Bway., New York, 7, N. Y., co munity bldg., Pa. 36031. Plans deposit C. Wagner, 133 W. 4 St., archt. CD 10/1 ENR 10/21.

Bids Asked November 8

N. B., Saint John—Abatteir Com., C Council, City Hall, abattoir. Extended d CD 10/15.

Bids Asked November 9

†O., Newark—Pub. Housing Auth., NH 2073 E. 9 St., Cleveland, 100 unit dwellin community bldg., Ohio 33285. $200,0 Columbus Associated Archts & Engineer 2901 N. High St., Columbus, archts. C 10/26—ENR 10/28.

Bids Asked November 10

†Neb., Harvard—Pub. Housing Auth., NH Dierks Bldg., 1006 Grand Ave., Kansas Cit Mo., 80 unit dwellings. Davis & Wilson, T Stuart Bldg., Lincoln, engrs.-archts.

†Utah, Tooele—Pub. Housing Auth., NH Dierks Bldg., 1006 Grand Ave., Kansas Cit Mo., community bldg., Utah 42167. Ashto Evans & Hodgson, Beneficial Life Bldg., Sa Lake City, engrs.-archts. CD 9/21—ENR 9/2

Bids Asked November 12

†Mich., Royal Oak—Pub. Bldgs. Admin 18 and F Sts. N.W., Wash., 25, D. C., brick concrete, frame health centre, Mich. 26-2 Approx. $150,000. FWA. F. D. Madison, Wayne-Oakland Bank Bldg., archt. CD 10/

Bids Asked November 15

Que., Gaspe—R. T. Donald, Dpt. Munitio & Supply, Ottawa, Ont., mess bldg., 2 barra blocks, boiler house, for Dominion Govt. Military Naval Services, Ottawa. On $150,000. Dpt. Naval Services, Cartier Squa Ottawa, Ont., archts.

Bids Asked November 16

†Ill., Downey—Veterans Admin., Vermo Ave., between H and I Sts. N.W., Wash., C., addnl. bldgs., facilities, etc. Extende date. CD 9/27—ENR 9/30.

Bids Asked November 16

†Ky., Hopkinsville—Federal Works Agen 18 and F Sts. N.W., Wash., 25, D. C., heal center. J. T. Waller, 1700 S. Virginia St archt.

Bids Asked November 16

Ky., Hopkinsville—W. P. Hogarty, dir. Dp Purchases Pub. Properties, 230 New Stat Office Bldg., Frankfort, reconstructing No. East and No. 4 West units of main ward bldg Western State Hospital. Plans deposit $2 P. S. Sinton, 110 New State Office Bldg Frankfort, ch. engr.

Bids Asked November 17

Ark., Arkadelphia — Arkadelphia Schoo Dist. 1, at office Supt. Schools, High Schoo Bldg., school. Plans deposit $10.

Bids Asked November 18

†Fla., Key West—Federal Works Agen 18 and F Sts. N.W., Wash., 25, D. C., hospit addn., Fla. 8-906. J. Allen Long, Key W archt. CD 8/20—ENR 8/26, under BA.

Bids Asked After November 25

†Pa., Birdsboro—Pub. Housing Auth., NH 270 Bway., New York, 7, N. Y., 160 un family dwellings, Pa. 36440. Plans depo $50. Eller & Mast, 147 N. 5 St., Readi archts.

BLIC BUILDINGS (Bids Asked, Cont'd.)

Bids Asked December 7

...t., Waco—Veterans Admin., Vermont ... between H and I Sts. N.W., Wash., ... bldgs., Nos. 90, 91, 92 and 93. CD 8/31 ...NR 4/8.

Bids Asked

...S. D. Provo—Pub. Bldgs. Admin., 18 and F ... N.W., Wash., 25, D. C., grade and high ...ool, $157,000. FWA. P. C. Bettenburg & ... 1437 Marshall Ave., St. Paul, 4, Minn., ...ts. CD 10/19—ENR 10/21.

...W BIDDERS

...California—U. S. Maritime Comn., Fi... ...cial Center Bldg., Oakland, Oct. 26, crafts ...r, electric shop and fitting and sub... ...tracting bldg., from Moore & Roberts, ... Mission St., San Francisco.

...California—Yards & Docks, Navy Dpt., 18 ... and Constitution Ave. N.W., Wash., D. C., ...x, Spec. 11957, NOY 7086, from Din... ...dle Constr. Co., Crocker Bldg., San ...ancisco. $427,000.

...Conn., Hartford—Bd. Contr. & Supply, 550 ...n St., Oct. 26, brick, steel isolation hos... ...l, Conn. 6104, from City Constr. Co., 955 ...n St., Bridgeport, $169,500. FWA. CD ...—ENR 10/14.

...Ga., Atlanta—Federal Works Agency, 18 ... F Sts. N.W., Wash., D. C., Oct. 27, nurses' ...s, Grady Hospital, Ga. 9-235, from Beers ...str. Co., 70 Ellis St. N.E., $159,745. CD ...—ENR 10/7.

...Tennessee—U. S. Eng., Grant St., west of ...twood St., Mobile, Ala., bldg., from Build... ... Constructors, Inc., Dermon Bldg., Mem... ... Est. under $500,000.

...Va., Newport News—City, Oct. 25, jail and ...inistration bldg., Va. 44-129, from Virginia ... Co., Newport News, $273,100. FWA. CD ...—ENR 10/21.

...Washington—Pub. Housing Auth., NHA, ...nner Bldg., 5 Ave. and Union St., Seattle, ...e 1, Oct. 22, housing, Wash. 45238, from ...ttleton & Baldwin, 6303 Fox St., Seattle, ...e 5, $413,500, CD 10/5—ENR 10/7.

...NTRACTS AWARDED

...Alabama—Goodyear Tire & Rubber Co., ...4 E. Market St., Akron, O., power plant, ... Rust Eng. Co., Liberty Life Bldg., Birming... ..., $400,000. CD 10/13—ENR 10/21.

...Alabama—Rheem Mfg. Co., 2901 35 Ave. N, ...rmingham, plant addn., to J. F. Holley ...nstr. Co., 905 5 Ave. S., Birmingham, $102,... ... Bids 10/15. Defense Plant Corp. will ...ance. D. O. Whildin, Empire Bldg., Bir...gham, archt. CD 10/12—ENR 10/21.

...Alabama—U. S. Eng., Grant St. west of ...twood St., Mobile, bldg., Inv. 569-44-138, ...bile Co., to Foster Creighton Co., Amer... ...n National Bank Bldg., Nashville, Tenn. ..., $40,000.

...Alabama—U. S. Eng., Grant St. west of ...twood St., Mobile, bldgs., access roads, ..., 569-44-143, Dale Co., to A. A. and C. C. ...ith, Hartford, Est. $40,000. Bids 10/10.

...California—U. S. Eng., 74 New Mont... ...gomery St., San Francisco, addnl. housing, ...thern California, Spec. 1169, to Ford J. ...aits & Morrison Knudsen Co., 3001 Russ ...g., San Francisco. Est. over $750,000. ...arded 10/26. CD 10/22—ENR 10/28.

...Calif., Berkeley-Albany — Pub. Housing ... Auth., NHA, 785 Market St., San Fran... ...co, 1,896 family dwelling units, on Gill ...ct, Calif. 4751, to Moore & Roberts, 693 ...sion St., San Francisco, $2,884,589. CD ...26—ENR 10/28, under LB.

...Calif., Oakland—Pub. Housing Auth., ... NHA, 785 Market St., San Francisco, 192 ...ily dwelling units, Calif. 4749, 500 family ...elling units, Calif., 4770 and 304 family ...elling units, Calif., 4771, to Standard Build... ... Co., 1500 Judah St., San Francisco, $1,... ...196. CD 10/22—ENR 10/28, under bids.

...Calif., Vallejo—Housing Auth. of City of ...llejo, Ryder St., landscaping work in con...ction with housing, Calif. 4732, 4511, 4512 ...d 4219, to F. W. Bullock, 445 12 Ave., San ...ancisco, $42,172. D. H. Horn, Hotel Clare... ...ont, Berkeley, archt.

...Connecticut—Pratt & Whitney Div., United ...craft Corp., 400 Main St., East Hartford, ...lg. alterations, incl. laboratories, inspection ...nt and warehouse, to Wadhams, May & ...rey Co., 15 Lewis St., Hartford. Est. ...5,000. CD 10/23—ENR 11/4.

...Connecticut—Pratt & Whitney Aircraft ...v., United Aircraft Corp., 400 Main St., ...st Hartford, brick, steel concrete experi... ...ental bldgs., to Wadhams, May & Carey Co., ... Lewis St., Hartford, $125,290. Defense ...nt Corp. will finance. Albert Kahn Asso... ...te Architects & Engineers, Inc., 345 New ...nter Bldg., Detroit, Mich., engrs. CD ...26.

...Indiana—Chevrolet Corp., J. Coyle, mgr., ...nderson, remodeling old bldgs. for new ...nt to A. J. Glaser Co., E. 12 St., Muncie, ...d Anderson Bank Bldg., Anderson. Est. ...00,000 or more with equip. Defense Plant ...rp. will finance. CD 10/22—ENR 10/28.

...Ind., Bunker Hill—Yards & Docks, Navy ...t., 18 St. and Constitution Ave., N.W., ...sh., D. C., exten. assembly and repair ...op, Brig., N A S, NOY 7415, to Gerhardt ... Meyne Co., 7 Dearborn St., Chicago, Ill., ...4,568.

...Ind., Crane (mail Stockwell)—Yards & ...cks, Navy Dpt., 18 St. and Constitution ...ve. N.W., Wash., D. C., general storehouse ...ldn., NOY 7469, to Pearson Constr. Co. Inc., ...entucky Home Life Bldg., Louisville, Ky., ...4,800.

The load-bearing capacity of a pile depends to a large extent on "skin friction"—the *grip* of the earth on the sides of the pile.

As shown in diagram "A", "brooming" may result when piles are driven without pile shoes. This condition results in an over-size hole, reduced "skin friction" and an insecure pile. When a pile shoe is used, as shown in diagram "B", the pile cannot "broom" making a clean hole and assuring maximum "skin friction".

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PUBLIC BUILDINGS (Contracts Awarded, Cont'd.)

†Illinois—U. S. Eng., 520 Merchandise Mart, Chicago, temporary frame bldgs., Contr. 11-032-eng-533, Fulton Co., to J. L. Simmons Co., Inc., Decatur, **$300,000.**

†New Jersey—U. S. Eng., 120 Wall St., New York, 5, N. Y., bldgs., Hudson Co., to Arthur Venneri Co., 259 N. Broad St., Elizabeth, **$200,000.**

†New Jersey—Hoffman-La Roche, Inc., Kingsland Rd., Nutley, brick, concrete penicillen mfg. plant, to White Constr. Co., 95 Madison Ave., New York, N. Y., **$300,000.** Federally financed. Felheimer & Wagner, 155 E. 42 St., New York, N. Y., archts.

†New Jersey—U. S. Eng., 6 and Walnut Sts., Phila., Pa., bldg., Burlington Co., to Edward Nichols Co., 5420 N. 12 St., Phila., Pa., **$50,000** plus.

†New Jersey—War Emergency Pipe Line, 705 Park Ave., Plainfield, 2 story, bsmnt., brick garage, to F. Bogert, 324 Railroad Ave., Hackensack, **$60,000.** Defense Plant Corp. will finance.

†Ohio—Pub. Housing Auth., NHA, 2073 E. 9 St., Cleveland, site imprvs. for mobile trailers, Ohio 33281-A, to W. B. Gibson Co., 200 Chestnut Ave., Warren, **$78,173.** Awarded 10/21. CD 9/21—ENR 9/23.

†O., Medina—Medina Community Hospital, altering former Weidner home, constructing 2 new brick, steel, concrete wings, to Cleveland Constr. Co., 3866 Carnegie St., Cleveland, **$174,100. FWA.** CD 8/16.

†Oklahoma—U. S. Eng., 416 Wright Bldg., Tulsa, Zone 2, bldg., Sol. 957-Neg-44-77, Oklahoma Co., to J. H. Putney, Colcord Bldg., Oklahoma City, **$71,000.** Bids 10/2.

†Oklahoma—U. S. Eng., 416 Wright Bldg., Tulsa, Zone 2, addnl. bldgs., facilities, "A", Sol. 957-Neg-44-75, Oklahoma Co., to Wise & Bales, Braniff Bldg., Oklahoma City, **$169,000.** Bids 9/29.

†Pa., Midland—Pub. Housing Auth., NHA, 270 Bway., New York, 7, N. Y., site imprvs. at Midland Heights, Borough of Midland, Pa. 36052, to Samkay Builders, Inc., 907 Law & Finance Bldg., Pittsburgh, **$24,450.** CD 8/5—ENR 8/12.

†Pa., Phila.—Pub. Housing Auth., NHA, 270 Bway., New York, 7, N. Y., community bldg., maintenance bldg. and commercial facilities, Pa. 36011-12, to Geo. H. Evans & Co., 1126 Fairmount Ave., **$149,766.** Bids 9/24. CD 8/5—ENR 8/12.

†Pa., Williamsport—Pub. Housing Auth., NHA, 270 Bway., New York, 7, N. Y., paving and storm sewers at housing, Pa. 36031, to D. B. Stabler, 600 N. 2 St., Harrisburg, **$82,877.** Bids 9/21. CD 9/9—ENR 9/16.

†R. I., Melville (mail Portsmouth)—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N. W., Wash., D. C., galley and mess hall, Naval Fuel and Net Depot, NOY 7459, to Gilbane Bldg Co. Inc., 90 Calverly St., Providence, **$170,333.**

†R. I., Quonset Point—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., paint spray shop, N A S NOY 6963, to R. I. Walsh Bros., 150 Hampshire St., Cambridge, Mass., **$388,900.** CD 10/14.

†Tex., Corpus Christi—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., engine test cell bldg. exten., NAS, NOY 7329, to W. S. Bellows Constr. Co., Bankers Mfg. Bldg., Houston, **$79,900.** CD 10/27.

†Va., Creeds—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., magazines and access roads, Auxiliary Air Station, NOY 7254, to C. M. Guest & Sons, 208 Dean Bldg., Norfolk, **$35,887.**

†Wash., Seattle—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., bachelor officer's quarters and dispensary, Naval Station, NOY 7105, to J. W. Bailey Constr. Co., 228 9 Ave. N., **$189,873.**

†Wash., Vancouver—Pub. Housing Auth., NHA, Skinner Bldg., 5 Ave. and Union St., Seattle, Zone 1, landscaping, grading, draining, at McLoughlin Heights housing, to Portland Constr. Co., 7340 SE Division St., Portland, Ore., **$218,521.** Awarded 10/19.

★**British Columbia**—Dpt. Munitions & Supply, Ottawa, Ont., 16 bldgs. for accomodation and instructional purposes, to Bennett & White Const. Co. Ltd., 510 W. Hastings St., Vancouver, **$630,000.** Awarded 10/15.

★**Que., Ste. Anne de Bellevue**—Dpt. P. Wks., Ottawa, Ont., mental and infirmary bldg. at Military Hospital, to Concrete Constr. Co., Ltd., 1082 Decarie Blvd., Montreal, **$669,000.** CD 10/5—ENR 10/7.

COMMERCIAL BUILDINGS

PROPOSED WORK

★**California**—Homes, Inc., 453 S. Spring St., Los Angeles, 250 frame, stucco dwellings, near Beverly and Atlantic Blvds., Los Angeles Co. Over $500,000.

Calif., El Monte—E. C. Harvey, 1145 E. Garvey Blvd., plans by C. H. Aldrich, 1834 Dawson Ave., Long Beach, 100 frame stucco dwellings. Over $150,000.

Calif., East Los Angeles (br. Los Angeles)—Realty Constr. Co., 5945 E. Washington Blvd., Los Angeles, plans by J. R. Friend, 132 W. 8 St., San Pedro, 108 frame, stucco dwellings. Over $150,000.

Calif., Lakewood—Artcraft Builders, Inc., ★Lakewood Blvd., at Sterns St., Long Beach, 500 frame, stucco dwellings. Over $1,500,000.

Calif., Lakewood Village—Fifth Defense ★Housing Corp., 4700 Clark Ave., plans by M. W. Baird, 647 N. Isabel St., Glendale, 225 dwellings. Over $500,000.

★**Calif., Long Beach**—Boulevard Homes Inc., 453 S. Spring St., Los Angeles, frame, stucco dwellings, Alameda and Clark Blvds., near here. Over $1,000,000.

Calif., Los Angeles—Trianon Homes, Inc., 119 S. LaBrea Ave., 80 frame stucco dwellings, San Fernando Valley. Over $150,000.

Calif., North Long Beach—Shoreham ★Building Co., 453 S. Spring St., Los Angeles, 203 frame, stucco dwellings. Over $500,000.

Mo., St. Louis—St. Malachy's Catholic Parish, Rev. R. W. Warner, pastor, Clark and Garrison Aves., Zone 3, day nursery on 75x120 ft. site, Clark and Garrison Aves. $150,000 with equip, etc.

★**O., Cleveland**—Eastern States Homes Inc., N. Preston, pres., 32 W. 48 St., New York, N. Y., 162 ft., brick frame duplex dwellings, 161 at 140 St. and Triskett Pl., 124 at W. 150 St. and Chatfield Ave., 64 at southeast corner Babbitt and Tungsten Rds., and 161 at southwest corner Babbitt and Tungsten Rds. $12,000 each.

Tex., Corpus Christi—Roy Seif, Corpus Christi, fifty-nine 1 story, frame dwellings. $150,000.

Tex., Houston (Galena Park area)—Baldwin Sheets Co., Electric Bldg., seventy-eight 1 story, frame, asbestos shingle dwellings. $350,000.

Tex., San Antonio—H. & C. Corp., National Bank Comm. Bldg., frame duplexes and single dwellings.

Wash., Seattle—Pacific Constr. Co., 8219 Ave. S.W., Zone 6, plans by M. Van House, owner, 38 houses, 16 Ave. S.W., and S.W. Bay St. $190,000.

BIDS ASKED

Bids Asked November 10

Pa., Dansville—George F. Geisinger Memorial Hospital, hospital addns., alterations, Wm. H. Lee, Schaff Bldg., 1505 Race St., Phila., archt.

CONTRACTS AWARDED

Ala., Mobile—Hartwell Place, Inc., c/o contractor, forty-one 1 story frame residences, Burland Constr. Co., 315 20 St. S., Birmingham. Est. **$205,000.**

Calif., Artesia—M. Nessel, 294 Argonne Ave., Long Beach, 50 frame, stucco dwellings near here. Owner builds. Over $150,000. C. N. Aldrich, 1834 Dawson Ave., Long Beach, archt.

★**Calif., Lakewood Village**—Griffith, Walker & Lee, 4124 Marber St., 800 frame, stucco dwellings. Owner builds. Over **$2,000,000.**

Calif., Lakewood Village—C. B. Robertson, 11065 Sunset Blvd., West Los Angeles, 1 duplex and 80 single frame, stucco dwellings. Owner builds. Over **$150,000.** C. N. Aldrich, 1834 Dawson Ave., Long Beach, archt.

Calif., Long Beach—Biltmore Homes, Inc., 2111 W. Willow St., 120 frame, stucco dwellings. Owner builds. Over **$150,000.** C. N. Aldrich, 1834 Dawson Ave., archt. C. 7/27—ENR 7/29.

Calif., Venice—Sepulveda Housing Corp., 1075 Subway Terminal Bldg., Los Angeles, 6 frame, stucco dwellings, to Drachliss & Berman, 1646 Wooster St., Los Angeles, approx. **$200,000.**

Conn., Bristol—The Pine Bldg. Corp., 114-73 Rd., Forest Hills, N. Y., 52 houses, Redstone, Marion and Grand Sts., Lorenzo and Walter Pl. Owner builds. **$208,000.**

Conn., Hartford—Kalda Constr. Co., c/o J. E. Kane, archt., 49 Pearl St., seven 1 story, brick garden apartment bldgs., Hughes Dr. Owner builds. **$325,000.**

★**Ga., Marietta**—Owner, c/o contractor, Plaza Forest Apartments, 135 bldgs., containing 500 dwelling units, to A. Farnell Blair, Decatur, about **$2,000,000.**

★**Md., Baltimore**—Du Pont Manor, Inc., Jeffrey and Race Sts., two hundred thirty-four story, bamnt., 14x27 ft. row-type residences. Owner builds. **$700,000.** Jerome Kahn, 1125 Belle Ave., archt.

Miss., Biloxi—W. Marshall Moore, 2764 Boulevard, Charlotte, N. C., 101 family dwellings. Owner builds. **$250,000.** CD 10/2—ENR 10/28.

★**Ore., Portland**—Myers Bros., 2407 Fernando Rd., Los Angeles, Calif., 16 dwellings. Owner builds. **$1,385,300.**

Tex., Brownsville — Thos. Joseph, Embree Bldg., Harlingen, thirty-five 1 story dwellings. Owner builds. **$185,000.** CD 9/17—ENR 9/23.

Tex., Dallas—Lockheed Hills Corp., Magnolia Petroleum Bldg., ninety-four 1 story frame dwellings. Owner builds. **$480,000.**

Tex., Fort Worth—Westgate, Inc., Waggoner Bldg., six 2 story, 34x37 ft., and ten 2 story, 24x73 ft. apartment bldgs., brick, frame. Owner builds. **$150,000.** CD 10/23—ENR 10/28.

Tex., Houston—R. C. Heiner, 7443 Park Pl. Blvd., sixty-eight 1 story, brick, concrete housing units. Owner builds. **$160,000.** J. Knoestman, 2017 W. Gray St., archt.

Tex., Houston (Pecan Park Area)—Pasadena Bldg. Co., Sterling Bldg., Houston, 36 single unit duplexes and apartments. Owner builds. Approx. **$150,000.**

Tex., San Antonio—House Plan Bureau, 412 Alamo National Bldg., thirty-seven or more 1 story, frame type duplexes. Owner builds. **$175,000.** CD 10/26—ENR 10/28.

INDUSTRIAL BUILDINGS

PROPOSED WORK

Ark., Little Rock—PLANT—Southwest Handle & Mfg. Co., Benton, new plant, foot of E. 14 St. $50,000, incl. mchy. and equip.

DUSTRIAL BUILDINGS (Proposed Work, ont'd.)

Waterloo—FACTORY—Waterloo Valve Compressor Co., 1400 East 4 St., ing ft. factory, Bway St. $100,000.
Wakefield — FACTORY — Sylvania ucts, Inc., Loring Ave., Salem, soon contract, altering 4 story, 50x175 ft. feeder t. S. H. Jones, c/o owner, archt.
J., Newark—FACTORY—United Elec- ics Corp., 42 Spring St., soon lets contract, tory bldg. over $40,000. Epple & Kahrs, Washington St., archts.
Pittsburgh — PLANT — S. L. Roush, t. 312 Chamber of Commerce Bldg., soon contract, 1 story, 100x146 ft., brick, steel g bldg. for Kerotest Mfg. Co., 2525 Liberty CD 10/26—ENR 10/26.
Mission — PLANT — Missouri Pacific R. Co., F. E. Bates, ch. engr., Missouri ific Bldg., St. Louis, Mo., 1 story, brick, crete processing plant new unit and re- ditioning. Brodo Products Co., 512 E. Ry. Wesaco, lessee.
San Antonio — STORAGE — Martin herf, 3402 W. Houston St., plans by L. Har- ston, 609 N.B.C. Bldg., 1 story, 75x80 ft., crete block storage bldg. $40,000.
Hudson—FACTORY—United Refrig- tor Mfg. Co., Hudson, factory bldg. to Silica-Jet mfg. plant, $60,000.
Pine Falls—PLANT—Man. Paper Co. Pine Falls, plant addn. $40,000.
B., Leger Corner—ABATTOIR, etc.— ks Bros. Ltd., 14 W. Market St., abattoir cold storage plant. $40,000.
Alexandria—FACTORY—Henri Gau- Co., 26 James St., Ottawa, 3 story, 50x100 factory, Armouries Hill.
Fort William—PLANT—Canadian Car dry. Co., Ltd. 620 W. Craig St., Montreal, addn., incl. firing butts, shelter and unition magazines. $40,000. C. D. Howe, P. V. Bldg., Port Arthur, engrs.
Gatchell—PLANT—Northern Ski Co. A. Isard, McKim, plant for manufactur- skis, shingles, doors, etc. $40,000.
St. Pie—MILL—Antoine Guertin & St. Pie, grist and flour mill. $40,000.
Vercheres—PLANT—Dalpe & Brother, ern dairy and dairy products plant.

BIDS ASKED

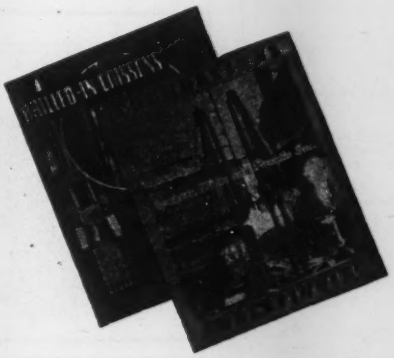
J., Newark—PLANT—Breeze Corp. of erica, 35 S. 6 St., 1 story, brick factory addn. $40,000.
Texas—FACTORY—General Tire & Rub- ber Co., 1708 E. Market St., Akron, O., tire mfg. factory. Approx. $5,500,000. Iredell, c/o owner, ch. engr. CD 10/20— R 10/28.
Tex., Texas City—PLANT — Monsanto Chemical Co., Texas City, and 1700 S. 2 St., Louis, 4, Mo., formaldehyde plant. $1,- 000. CD 10/19—ENR 10/21.

CONTRACTS AWARDED

Calif., Los Angeles — FACTORY — Weber owcase & Fixture Co., 5700 Avalon Blvd., nd part 2 story, 120x375 ft., brick factory n., to Steed Bros., 714 Date Ave., Alham- approx. **$80,000.**
Calif., Vernon—WAREHOUSE—Federal Ice Cold Storage Co., 4224 District Blvd., 145 ft. warehouse addn., to Baruch Corp., S. Olive St., Los Angeles, over **$40,000.** ah, Smith & Powell, 576 Architects Bldg., Angeles, archts.
Conn., Norwalk—FACTORY—American Hat Grand St., extensive factory alterations, rvs., to W. J. Barney Corp., 101 Park Ave., York, N. Y. Est. **$40,000.** D. Mansell, Park Row, Stamford, archt.
Conn., Oakville—FACTORY—Auto Wire Oakville, brick factory addn., to Fusco- atrada Co., 59 Amity Rd., New Haven. **$60,000.** W. Gaillard, c/o owner, engr.
Maryland — FACTORY — Kelly Springfield Co., Cumberland, factory bldg. addns. to F. Hazelwood, Cumberland.
N. J., Newark—WAREHOUSE—B. & M. Treating Co., 220 Clifford St., 1 story, steel warehouse, to D'Alessio Const. 790 Broad St., **$42,000.** T. Heathcote, Lafayette Ave., Hawthorne, engr.
Ohio, Cleveland — PLANT — Ohio Overall ning Co., Wm. N. White, pres., 3008 Cen- Ave., 1 story, 50x150 ft., brick, steel con- laundry addn., to A. Thomas, 2488 E. St., Est. **$40,000.** H. N. Morse Co., 1500 perior Ave., engrs and archts.
Okla., Tex., Hawkins (Yantis P. O.)—PLANT— Humble Oil & Refining Co., Humble Bldg., ston, and Natural Gasoline Corp., P. O. 1589, Tulsa, Okla., 60,000 gal. daily capac- Hi-Octane gasoline plant to Gasoline Plant r. Corp., Second National Bank Bldg., ston, **$460,000**; 100 mi. 3- to 24-in. crude athering pipeline, to Anderson Bros. r. Co., Tulsa, Okla., **$93,000.** CD 10/22 10/28.
Ont., Montreal — PLANT—Howard Auto- c Heat & Air Conditioning Ltd., 4209 W. Catherine St., 3 story, 40x50 ft., brick t exten., concrete fdn., to J. Laberge, 280 ton Ave., Mount Royal.
Que., Westmount—PLANT—Albert Paper Ltd., 42 Selby St., replacing plant de- ed by fire, to Concrete Constr. Ltd., 1082 rie Blvd., Montreal, Est. **$40,000.** May- tch & Bernstein, 1178 Phillips Pl., treal, archts. CD 1/27—ENR 2/11.

Proposal Advertisements see p. 178
Postwar Projects see p. 161

FOUNDATIONS
PRETEST UNDERPINNING
CONCRETE-STEEL PILES
MASS CONCRETE CONSTRUCTION
HEAVY SHORING
DRILLED-IN CAISSONS



Send for catalogs descriptive of the latest foundation types and methods

SPENCER, WHITE & PRENTIS, INC.
10 EAST 40th ST. NEW YORK, N. Y.

ESTABLISHED 70 YEARS AGO THE NAME LIDGERWOOD IS SYNONYMOUS WITH HOISTS AND HOISTING AND CONVEYING MACHINERY
"Our field is the World"

LIDGERWOOD Established 1873
MANUFACTURING COMPANY
Main Office and Works ELIZABETH, NEW JERSEY
Steam, Electric Gasoline and Diesel Hoists Cableways
Marine Auxiliaries: Steering Gears Deck Winches Towing Machines

THE MOST FOR THE MONEY

SPEED - EFFICIENCY - ECONOMY

CONSTRUCTION BY CONTRACT

THE ASSOCIATED GENERAL CONTRACTORS OF AMERICA, INC. · MUNSEY BLDG. WASH. DC

OFFICIAL PROPOSALS

Official notices of bids wanted on construction and related work, equipment and material for government, state, municipal departments and private enterprises

RATE: *The Rate for Official Proposal Advertising is 50 Cents per line (or fraction) per Insertion*

COPY RECEIVED *up to 10:00 A. M. Tuesday for Issue out Thursday Subject to Space Open for Last Minute Ads*

SEND COPY *to Official Proposal Division, Engineering News-Record, 30 W. 42nd St., New York, N. Y.*

OFFICIAL PROPOSAL

Bids: November 9, 1943 (192)

General Construction, etc.

WAR PUBLIC WORKS PROJECT
No. PA 36-133
The Titusville Hospital, Titusville, Pa.

Separate sealed bids for an addition to The Titusville Hospital for I—General Construction, II—Heating and Ventilating, III—Plumbing, IV—Combined Bid for Heating and Ventilating (II) and Plumbing (III), and V—Electrical Work, including alterations to the present building, will be received by The Titusville Hospital, Titusville, Pa., at the office of the Secretary, Room 301, Second National Bank Building, Titusville, Pa., until 3 o'clock P.M. E.W.T. November 9, 1943, and then at said Secretary's office, publicly opened and read aloud.

The Information for Bidders, Form of Bid, Form of Contract, Plans, Specifications, and Forms of Bid Bond and Performance Bonds may be examined at said office. Copies thereof may be obtained by making application to Charles F. Owsley, Registered Architect, 211 North Champion Street, Youngstown, Ohio, upon payment of $25.00 for one set. Any bidder, upon returning such set promptly and in good condition, will be refunded his payment, and any non-bidder upon so returning such a set will be refunded $15.00.

The Titusville Hospital, Titusville, Pa., reserves the right to waive any informalities in or to reject any or all bids.

Each bidder must deposit with his bid security in the amount of 5% of his bid in the form and subject to the conditions provided in the Information for Bidders.

Attention of bidders is particularly called to the requirements as to conditions of employment to be observed and minimum wage rates to be paid under the contract.

No bidder may withdraw his bid within 45 days after the actual date of the opening thereof.

THE TITUSVILLE HOSPITAL
By James M. Light
President

Attest:
Floyd B. August
Secretary
October 20th, 1943

Additional OFFICIAL PROPOSAL Advertisements on page 179

WHERE TO BUY

Featuring additional products, specialties, and services for the Construction Industry

IMMEDIATE DELIVERY
With "Preference Rating"
UNIVERSAL Level - Transit
Telescope 12" long, 25 Power—Horizontal Circle 4½" with vernier to minutes—Vertical Arc 3"—Instrument weighs 11 pounds, tripod pounds.
Price complete with Tripod, Carrying Case, Sunshade, and Dust C $115.00. Can be furnished with a compass at $12.50 extra.
ORDER BY MAIL
Expert Repairing of All Makes of Instruments
FREE INTERESTING BOOK—"HOW TO LAYOU BUILDING LOTS"—FREE—WRITE TODA
DAVID WHITE COMPANY 305 W. Court Stree Milwaukee, Wisconsi

STEEL ERECTING • RIGGING
MACHINERY MOVING
20 CRANES — 60 TRUCKS
12 HEAVY DUTY TRAILERS
ROGER SHERMAN TRANSFER CO.
Hartford, Conn. New Haven, Conn.

GOLDEN COMMISSARY CORPORATION
Executive Offices 3051 M. St. N.W. Washington, D.C.
COMMISSARY CONTRACTORS
New York Offices 67 W. 44th St. New York City
We operate construction camps, cafeterias, canteens, boarding and lodging facilities, for contractors, railroads and industrial plants, anywhere in America.

TERRY ENGINEERING COMPANY
STEEL ERECTORS
BRIDGES - TOWERS - BUILDINGS
TANKS AND WELDING
103 Park Avenue, New York, N. Y. MUrrayHill 5-0166
Colorado Bldg., Washington, D. C. MEtropolitan 2028

BLASTING ENGINEERS
We Specialize in the REMOVAL of SALAMANDERS, CONCRETE FOUNDATIONS, SLAG DEPOSIT POCKETS, ROCK, Etc., Etc.
CHICAGO CONCRETE BREAKING CO.
Edw. Gray, Pres.
6247 Indiana Ave., Chicago NORMAL 0900

This WHERE TO BUY *Section* supplements other advertising in this issue with these additional announcements of products and services essential to efficient and economical operation in the construction industry.
ENGINEERING NEWS-RECORD

Let Us Write Your Contract Bonds
THE ÆTNA CASUALTY and SURETY COMPANY
HARTFORD CONNECTICUT
Agents From Coast to Coast

OFFICIAL PROPOSALS

(Continued from opposite page)

Construction of a Sewer Tunnel

JOINT MEETING, CITY HALL,
EAST ORANGE, N. J.
CTION III, RELIEF TRUNK SEWER
CONTRACT 1
DIVISION B SEWER TUNNEL

Sealed proposals will be received for the unicipalities hereinafter named for the nstruction of a sewer tunnel under Con-act 1, Division B:

The City of East Orange, Township of llside, Town of Irvington, Township of piewood, Township of Millburn, City of ewark, Borough of Roselle Park, Village South Orange, City of Summit, Township Union and Town of West Orange, New rsey, organized in Joint Meeting under provisions of an Act entitled, "An Act authorize two or more municipalities in State to jointly construct and maintain let or trunk sewers", approved March 15, 1899, and the supplements and amendments thereto, hereinafter referred to as the Joint Meeting.

Said proposals will be received in the Council Chamber, City Hall, East Orange, New Jersey at 3:00 P. M., Eastern War Time, on Friday, the 26th day of November, 1943, at which time they will be publicly opened and read.

Division B includes the construction of a sewer tunnel approximately 3021 feet long, and either 60 or 66 inches in diameter.

No bids will be received unless made in writing, on blanks furnished and accompanied by a certified check for an amount not less than ten per cent (10%) of the amount of the bid, made payable to the Treasurer of the Joint Meeting.

The Joint Meeting reserves the right to reject any or all proposals, and to accept that one which, in its judgment, best serves the interests of the contracting municipalities.

OFFICIAL PROPOSALS

Prospective bidders are hereby notified that this project has been assigned a priority rating of AA-3, and a CMP allotment number S-2602-068 which specifically permits the use of steel liner plates.

Plans, profiles and specifications may be seen at the office of Edward S. Rankin, Secretary, City Hall, Newark, New Jersey, and seen or procured at the office of Elson T. Killam, Consulting Engineer, 142 Maiden Lane, New York, N. Y., upon payment of Thirty Dollars ($30.) which amount will be refunded only to contractors submitting bona fide proposals, and who return the plans and specifications in good order within ten days after opening of bids.

By order of the Joint Meeting.

G. Harry Cullis,
Permanent Chairman.
Edward S. Rankin,
Secretary.

Elson T. Killam,
Consulting Engineer.

SEARCHLIGHT SECTION

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

UNDISPLAYED RATE:

10 cents a word, minimum charge $2.00. POSITIONS WANTED (full or part-time individual salaried employment only), ½ the above rates, payable in advance. (See ¶ or box Numbers.)

PROPOSALS, 50 cents a line an insertion.

INFORMATION:

BOX NUMBERS in care of any of our New York, Chicago or San Francisco offices count 10 words additional in undisplayed ads.

DISCOUNT of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

The advertising rate is 6.90 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches —to a page. E.N.R.

NEW ADVERTISEMENTS received by November 12th appear in November 18th issue subject to limitation of space available

POSITIONS VACANT

ose Positions Vacant advertisements are blished subject to agreement by the adver-ers not to consider applicants now em-yed on war work unless they obtain writ-release from present employer.

ELD ENGINEERS and Draftsmen, Civil Engineers Office, Pittsburgh District, Mu-ipal and topographical work. P-938, Engi-ering News-Record, 330 W. 42nd St., New rk 18, N. Y.

GINEER or ESTIMATOR. Graduate en-gineer 30-40 with experience in building nstruction. Permanent connection for the per man. Give age, education, experience, ary expected, reference and draft status in r letter in own handwriting. Enclose re-t photo. P-969, Engineering News-Record, N. Michigan Ave., Chicago 11, Ill.

SALARIED POSITIONS

This advertising service of 33 years' recognized standing negotiates for high salaried supervisory, technical and executive positions. Procedure will be individualized to your personal requiremen's and will not conflict with Manpower Commission. Retaining fee protected by refund provision. Identity covered and present position protected. Send for details.

R. W. BIXBY, INC.
272 Delward Bldg., Buffalo, N. Y.

EMPLOYMENT SERVICE

ENGINEERS — Mechanical—Industrial—Electrical Chemical—Civil—Architectural, etc. Our specialized service to Technical and Scientific men only, for over 50 years, continuously at the same address, enables us to offer a fine selection of positions for high grade Manufacturing Executives, Production Managers, Metallurgists, and Technical men of all types. The Engineering Agency, Inc., 53 W. Jackson Blvd., Chicago 4, Ill.

POSITIONS WANTED

STRUCTURAL DESIGN ENGINEER, Graduate C.E. Age 40, 18 years experience design and detail structural steel, concrete and timber structures such as Shipways, Docks, Quays, Industrial and Commercial Buildings. Capable of taking charge of all structural design and specifications for a complete project. PW-894, Engineering News-Record, 68 Post Street, San Francisco 4, Cal.

DESIGNING ENGINEER Graduate registered age 42, thoroughly experienced in design, estimates inspection specifications for heavy structures. Railroad Highway rigid frame-bridges industrial buildings etc. Available for responsible position. Part or full time. Best references. PW-956, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

POSITIONS WANTED

GENERAL SUPERINTENDENT or Assistant Project Manager—25 years experience supervision and estimating industrial and commercial buildings. Federal Housing Projects, railway and highway bridges, water treatment and sewage disposal plants. Past three years in Southeast on Naval air station and training base. Good record and reliable references. Available after November 1st with competent field organization. PW-935, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

CONTRACTOR'S FIELD ENGINEER. Industrial, Commercial and Public Buildings; Airports, Bridges. PW-945, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

SUPERINTENDENT. Excavation, Grading, Sewers, Water Lines, Foundations, Bridges, Buildings. PW-946 Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

CONSTRUCTION SUPERINTENDENT 20 years Paving Sewers. Excavating Quarrying Asphalt and Ready Mix concrete also accounting purchasing. South or Central America preferred. PW-950, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

(Continued on the following page)

POST-WAR APPOINTMENT

Designer required by firm manufacturing in Great Britain, range of Steam Turbines up to 1000 b.h.p. Applicants must have had wide experience in design, production and manufacture of turbines and auxiliaries, including condensing plant. Answer in first instance with full details of experience, age and salary expected, all of which will be treated in confidence, to Stevenson & Scott Ltd., 660 St. Catherine Street West, Montreal, Que.

SEARCHLIGHT SECTION

POSITIONS WANTED
(Continued from preceding page)

MANAGER OR SUPERINTENDENT structural steel fabricating plant; 25 years experience; age 50; married; go anywhere; permanent position only; can furnish A-1 references; capable handling any size plant and get results. PW-959, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

LICENSED CIVIL ENGINEER and Surveyor. Experience covers supervision of large land and topographical surveys, general construction and layout work. Available Nov. 15. PW-960, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

SUPERINTENDENT — Carpenter Foreman — all types—Concrete and Heavy construction. Industrial Federal Housing. Age 40 years, graduate Civil Engineer, 2 years foreign experience. PW-963, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

STRUCTURAL ENGINEER, 29, M. I. T. graduate, 7 years varied experience in structural design. Available immediately. Married, one child, 3A. Prefer responsible position in any phase of structural engineering anywhere in U. S. Will travel. Stanley Levitt, 1503 Washington Ave., Greenville, Miss.

CIVIL ENGINEER, graduate; 34 years experience; design and construction; water supply; industrial plants; power plants; hydroelectric developments. PW-970, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

GRADUATE CIVIL ENGINEER. Licensed. Immediately available. Draft class 3A. 9 years experience includes surveying, construction, plan and estimate examination, hydraulic and structural designing, estimating. Desire structural design work. PW-971, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

STRUCTURAL ENGINEER—AGE 40—16 years on design and supervision of Structural Steel, Concrete and Timber Structures Foundations. Available now. PW-972, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

MASTER DIVER; Available now. With or without gear. 20 years experience on all phases of underwater work. Reliable references if desired. Capable of taking charge of job. Go anywhere. PW-974, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

SALES ENGINEER with twenty years of experience in heavy equipment and thorough knowledge of heavy construction methods, wants connection Norfolk, Va. PW-976, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

INSTRUMENTMAN, eight years experience, desires foreign employment. PW-978, Engineering News-Record, 520 N. Michigan Ave., Chicago 11, Ill.

CONSTRUCTION & MAINTENANCE SUPT. 20 years experience in U. S. and Foreign countries; just returned from Alaskan Highway. Have 100 skilled heavy and light duty construction personnel. Available now. PW-979, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

WORK WANTED

EQUIPPED SURVEY PARTIES for all types of surveyor construction work. Any location. Harwood, 258 Broadway, New York City.

CONCRETE CONTRACTORS — Just completed Government operation; can place entire organization including masons and laborers on an immediate job any place in the United States. Will furnish best of reference and completion bond. WW-976, Engineering News-Record, 430 W. 42nd St., New York 18, N. Y.

PATENT ATTORNEYS

PATENTS, TRADE MARKS. Booklet: "General Information Concerning Inventions and Patents and "Fee Schedule" sent without obligation. Established 1915. Lancaster, Allwine & Rommel, Suite 454, 815 15th St., N. W., Washington, D. C.

WANTED

TRANSITS AND LEVELS accurately repaired, also bought, sold or rented; quick, first-class service. Griner, 920 Oak, Kansas City, Mo.

FOR SALE

FRUEHAUF FULL CARRYALL TRAILER—Model CPT-10, capacity 10 ton, vacuum brakes, dual wheels. Purchased new, has been used twice and proven impractical for sellers operations. Will sell for $2500.00 f.o.b. Crooksville, Ohio. Address Box 151, Newark, Ohio.

A COURSE OF INSTRUCTION BY MAIL IN

STRUCTURAL ENGINEERING

Thirty-third Year

(In the following list, Courses A, B, and C are abbreviated from our complete Structural Engineering course).

A—Public Works Structures.
B—Architectural Engineering.
C—Special Course (State Board Exams. for P.E.)
D—Structural Engineering (complete).
E—Preparatory Course (for non-technical men).

Our Courses are offered principally to

ADULT CIVIL ENGINEERS AND ARCHITECTS

Ninety percent of our engineering students are former graduates (C.E.) from engineering colleges. Our courses have helped thousands of engineers to better positions, increased pay, and success "after forty".

Course B has helped many architects and draftsmen in passing the structural portion of State Board Examinations for license.

Literature sent without expense or obligation. **Write TODAY.**

WILSON ENGINEERING CORPORATION

College House Offices Harvard Square Cambridge, Mass., U. S. A.

SELLING OPPORTUNITIES

OFFERED—WANTED

Selling Agencies—Sales Executives
Salesmen—Additional Lines

OFFERED

CHEMICAL SALES REPRESENTATIVE. National Manufacturer and Distributor chemicals for wood preservation desires permanent sales representative. Salary-bonus. Location Southeast or Middle West. Considerable traveling. Knowledge sales to lumber mills or dealers necessary. Chemical or paint experience desirable. Give age, draft status, education, experience, salary. All replies treated confidentially. H. N. Anderson, 333 Bldg., Chicago, Ill.

WANTED

SALES ENGINEER wishes to represent firms manufacturing wood or steel products for building and industrial trades in western Pennsylvania and vicinity. Will consider post war opportunities. RA-973, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

FOR SALE

PATENT or PATENT RIGHTS FOR TIMBER COUPLING

Timber coupling is a metal device used with bolts in wood construction by which the maximum tensil value of the wood may be obtained with the minimum number of bolts. Tests indicate that TIMBER COUPLING is more efficient than any other type of connector. A money maker for some one. For information address,

GEO. L. KELLY
616 Fannin St. Houston 2, Texas

EXCAVATING CONTRACTORS WANTED ON COAL STRIPPING OPERATIONS

Several good stripping jobs available in the bituminous coal fields of Penna., West Virginia, Maryland & Kentucky. Jobs ranging in size from 100,000 coal tons (estimated) to 2,000,000 tons or more (estimated). Opportunity for Contractors with good sized Shovels—Draglines—Scrapers—Bulldozers and Trucks to immediately secure well paying, long-term contracts with responsible companies in an important defense industry.

A list of the equipment you own is necessary to determine the size of the job you can profitably handle; include a list of any equipment suited to this work you may have for sale.

BO-968 Engineering News-Record
330 West 42d St., New York City 18, N. Y.

New "SEARCHLIGHT" Advertisements received by 10 A. M. Friday will appear in Thursday's issue, subject to space limitations.

Departmental Staff
ENGINEERING NEWS-RECORD
330 West 42nd St., New York 18, N. Y.

WANTED

GENERAL SALES MANAGER

Large mid-western road machinery concern with excellent post-war prospects and virtually no conversion problem is seeking a top-notch sales executive to become Vice-President and General Sales Manager. The man we select must be an aggressive, administrative type with a thorough understanding of the road equipment game and a proved record of sales results. He must also be a tactful, resourceful individual with plenty of energy and a personality that "takes well" with distributors.

To such a man we offer an almost unlimited future, with starting salary commensurate with ability. Please include recent snapshot, complete experience, age and draft status in first letter. All replies will be treated in strict confidence and our organization already knows of this advertisement.

Address SW 977 Engineering News-Record, 520 No. Michigan Ave., Chicago, Ill.

DESIGNING ENGINEERS

Manufacturer nationally advertised system timber construction desires designing engineers as distributors. Liberal discounts for part time work. Good opportunity for postwar business. State experience, age.

RW-868, Engineering News-Record
330 W. 42nd St., New York 18, N. Y.

FOR SALE

Gypsum Mine, as a going proposition, or will dismantle and ship. Capacity 50 tons per hour.
This plant now in operation and production at Victor, New York.

ROC GYPSUM, INC.
Victor, New York

E
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